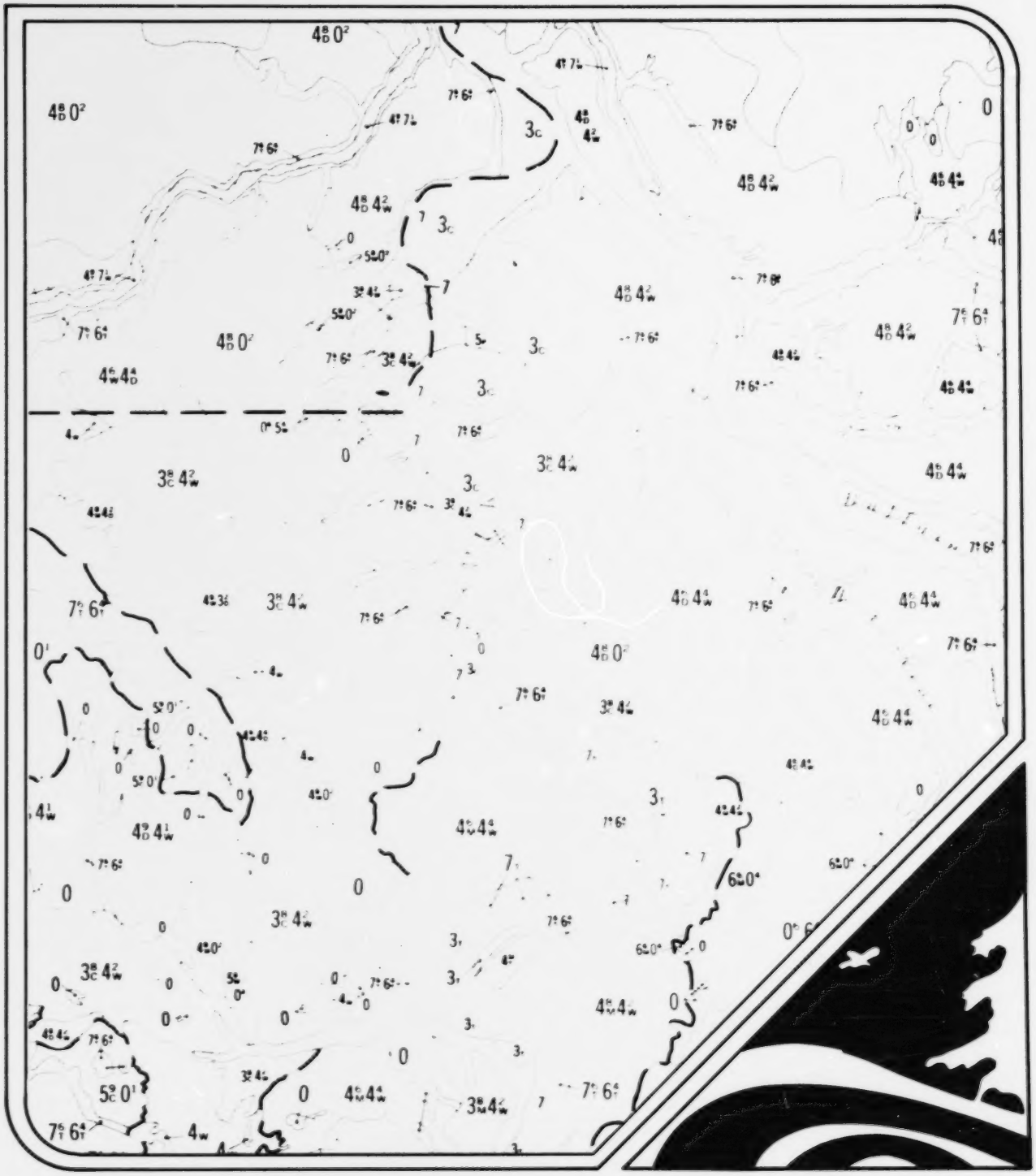
Soil Capability for Agriculture

A Summary and Application of Canada Land Inventory Data in Alberta

Alberta

ENERGY AND NATURAL RESOURCES

Resource Planning Branch



SOIL CAPABILITY FOR AGRICULTURE

A SUMMARY AND APPLICATION OF CANADA LAND INVENTORY DATA IN ALBERTA

Alberta Energy and Natural Resources
Resource Evaluation and Planning
Resource Planning Branch
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1. INTRODUCTION

Since 1948, decisions whether to develop or not develop Alberta's public land for agriculture have been made within a broad policy level framework of the Green/Yellow/White Area Policy. The more detailed decisions have generally been made on an **ad hoc** or site specific basis to meet local demands, which may or may not be consistent with regional or provincial priorities for public land management. In view of continuing local pressures to open public land for agriculture, and two recent reports recommending the conversion of millions of hectares of forested public land to agricultural land use (Horner 1981, Water Advisory Committee 1981), there is clearly a need to develop a provincial policy for agricultural expansion. Such a policy must be produced in an integrated resource management context to ensure provincial goals for all resource uses (e.g. forestry, wildlife and water) are considered in the allocation of land for agricultural uses. It must also take into account the potentials to expand/intensify agriculture on the present agricultural land base.

The objective of this report is to summarize Canada Land Inventory (CLI) Soil Capability for Agriculture data for the entire province. This analysis works toward answering the questions: how much public land has an agricultural capability and where is it located? Although a major focus of this report is to determine the location and extent of agricultural capability on public land, this potential can only be considered in relation to other potentials for expansion and/or intensification of agriculture on the present agriculture land base.

2. ORGANIZATION OF THE REPORT

All Canada Land Inventory data summarized in this report were either accessed from published literature or obtained through the computerized Canada Land Data System (CLDS). Soil Capability for Agriculture data were ordinated based on a number of administrative boundaries for summary purposes. Appendices are utilized to supply more detailed information and lengthy tables of information that are not suitable for inclusion in the main body of the report.

Chapter 3 of this report describes the Canadian Geographic Information System which was the major source of CLI data used in the report. A detailed evaluation of CLI is given in Chapter 4 because many users have criticized the system and there are valid reservations that must be considered when using it. In spite of these reservations CLI is the only data source that could be utilized for this level of analysis, and it is acceptable at this scale. Chapter 5 describes the CLI data based on a number of administrative subdivisions and also looks at the potential for expansion/intensification on public land and on the present agricultural land base.

Appendix 1 describes the classes used in the CLI system. Appendices 2 and 3 summarize data based on Alberta Administrative Units and Forest Management Units.

3. THE CANADIAN GEOGRAPHIC INFORMATION SYSTEM

A major source of CLI Soil Capability for Agriculture information used in this report was the computerized data bank system called the Canadian Geographic Information System (CGIS) which is part of CLDS. This system is administered by Lands Directorate, Environment Canada. It provides access to CLI map data, census and administrative data, and other land data through remote terminals via telephone link. The information can be retrieved in either report or graphics form through the Interactive Graphics Subsystem (IGSS). Access to the system can be obtained through the Alberta Remote Sensing Centre, Alberta Environment.

CGIS applies the data handling capabilities of computers to the tasks of summarizing, ordinating and manipulating the large amount of data collected in the Canada Land Inventory. It is a system of reading, storing and comparing maps that were input to the system with a drum scamer or X-Y digitizer. Information is expressed as a collection of polygons or map units each with a unique identifier. The computations of the acreages for these polygons only recognizes the dominant class of capability in complex areas.

Graphics information from the system is displayed either in a tabular summary of data or plotted polygons. The tabular summary of information is displayed by area on the screen in hectares, acres, or both, for any predetermined polygon which has initially been entered into the system. Plotted information can be displayed at a variety of scales on the terminal screen, and then reproduced on a hard copy printer. These hard copies provide permanent records of tabular or plotted data from the screen. The system also has an option to produced map information on a Gerber plotter in Ottawa. The report function has the capability to sort predetermined areas so that polygon values can be summarized within an area which has been subdivided into smaller land areas. For example, CLI Soil Capability for Agriculture class 2 land can be displayed for a certain administrative area and any predetermined part of that area.

By agreement Lands Directorate, Environment Canada has established a data base titled Albert on CGIS for the Resource Planning Branch for use in this project. It contains CLI Forestry and Agriculture data for the province. In addition the following variables were digitized and entered into the data base: Shorelines, Electoral Districts, Enumeration Areas, Alberta Administrative Units, Forest Management Units and Green, Yellow and White Area boundaries.

4. AN ASSESSMENT OF CLI SOIL CAPABILITY FOR AGRICULTURE DATA

The CLI data base is used because it is the only data base with complete coverage of lands with developable agricultural capability (Figure 1) and the system is reliable for this kind of broad overview. This data base has been criticized by many users, but much of this criticism has grown from a misunderstanding of how the data base was developed, of the purpose for which it was designed and also from inappropriate applications of the data. A review and evaluation of CLI Soil Capability for Agriculture is given here to illustrate its limitations and utility for this type of study.

The need for a land capability inventory was realized in the early 1960s when it became apparent that land use planning and allocation decisions could be based on fallible judgment in the absence of an extensive program such as CLI (Brocke 1977).

The Canada Land Inventory was a comprehensive survey of land capability for agriculture, forestry, recreation and wildlife (Canada 1978b.). It was a cooperative federal-provincial program administered under the Agricultural Rehabilitation and Development Act of June, 1961. Conducted at a reconnaissance level intended for broad level planning, not for local level management, the inventory was never intended to provide detailed site specific information, but rather to draw attention to areas which may require a more detailed investigation.

In Alberta, the Soil Capability for Agriculture classification was initiated in 1963 under W.E. Bowser, Officer-in-Charge, Soil Survey Branch, Agriculture Canada, and W. Odynsky, Head, Soils Division, Alberta Research Council. Many of the subjective decisions required by CLI were based on existing soil surveys that had classified and mapped soil based on inherent characteristics, soil surveys that were under preparation and air photo interpretation where soil survey information was unavailable. Further information was acquired from climatological records and publications, and from crop data reports of the Department of Soil Science, University of Alberta and Agriculture Canada Research Stations.

The CLI Soil Capability for Agriculture classification groups mineral soils into seven classes according to their potentials and limitations for agriculture (Appendix 1 describes these classes). The system is hierarchical in that the province was first divided in broad climatic zones (Bowser 1967), and land capability ratings were applied within these areas. For example, by definition land in agroclimatic area 3H could not have a higher classification than 3. Furthermore, the degree of limitations of slope and texture were dependent on the agroclimatic area. The class numbers (i.e. broadest level) are an assessment of the degree or intensity of limitation, while the subclass

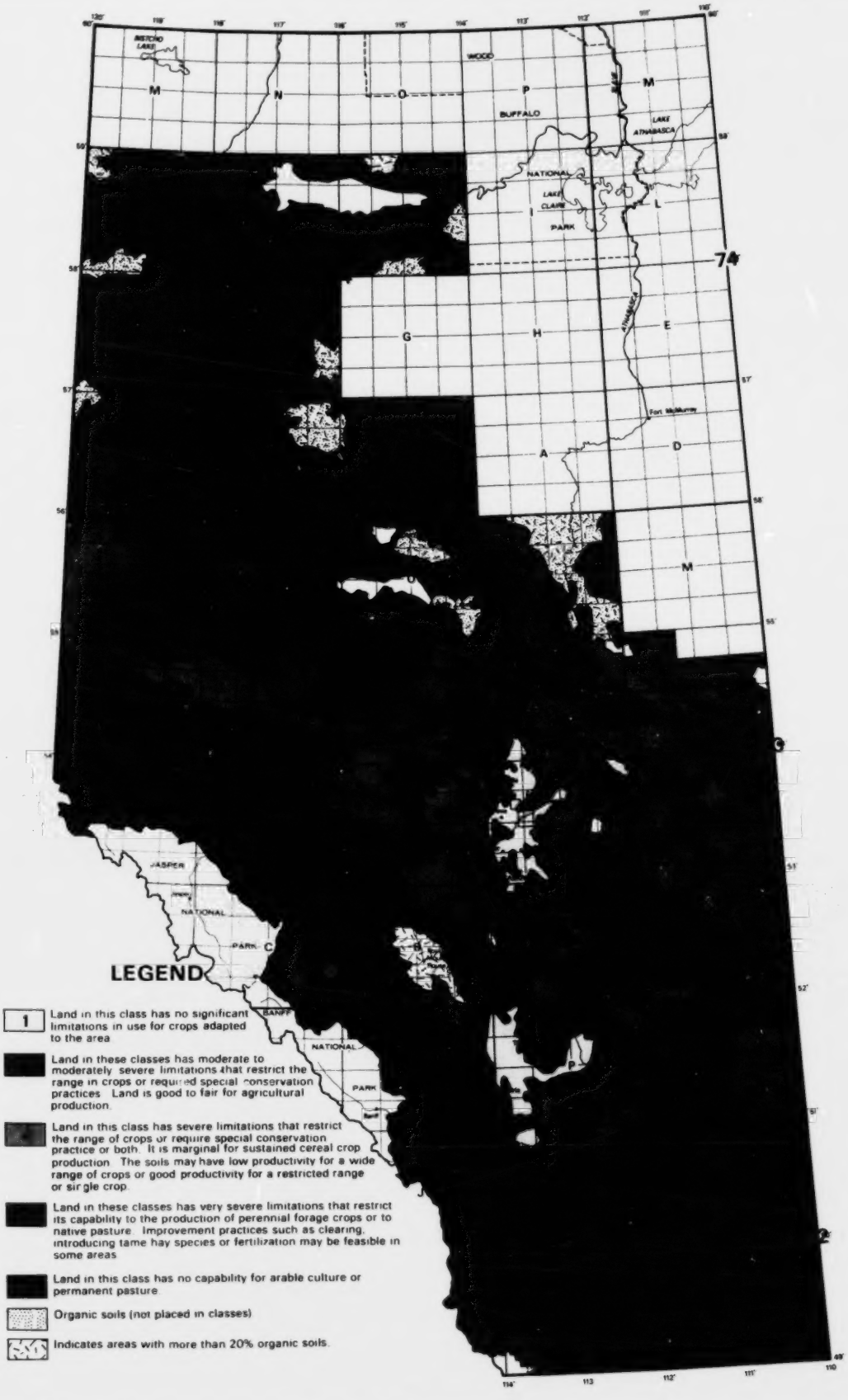
LEGEND
1 Land in this class has no significant limitations in use for crops adapted to the area.
Land in these classes has moderate to moderately severe limitations that restrict the range in crops or required special conservation practices. Land is good to fair for agricultural production.
Land in this class has severe limitations that restrict the range of crops or require special conservation practice or both. It is marginal for sustained cereal crop production. The soils may have low productivity for a wide range of crops or good productivity for a restricted range or single crop.
Land in these classes has very severe limitations that restrict its capability to the production of perennial forage crops or to native pasture. Improvement practices such as clearing, introducing tame hay species or fertilization may be feasible in some areas.
Land in this class has no capability for arable culture or permanent pasture.
Organic soils (not placed in classes).
Indicates areas with more than 20% organic soils.
JASPER NATIONAL PARK
BANFF NATIONAL PARK
BUFFALO
LAKE ATHABASCA
NATIONAL LAKE CLAIRE PARK
Fort McMurray
74

FIG. 1 CANADA LAND INVENTORY CLASSESS FOR AGRICULTURE IN ALBERTA

letter describes the kind of limitation responsible for the class number (Brocke 1977).

Homogeneous polygons rarely appear in the CLI Soil Capability for Agriculture classification because it was based on reconnaissance level soil surveys. Small inclusions (less than 10 per cent) of different classes were impossible to symbolize on the map due to the small scale of mapping. In addition, capability maps were reduced in scale so that grouping of soil units was required thus increasing the complexity of individual units. In many cases different soils had to be grouped together because they had the same level of limitations even though they had different kinds of limitations. All of these constraints had to be built into the classification system so that CLI Soil Capability for Agriculture could meet its objective of being a broad comprehensive inventory.

Absolute errors from the interpretation, analysis and transfer stages of the soil surveys were passed on to the capability analysis. Similar human errors would also have been generated during the capability analysis. Additional absolute errors were introduced in the establishment of data base ALBERT on CGIS for this analysis. For example, the overlay of common Forest Management Unit and Green Area boundaries may not correspond exactly because of errors in digitizing. All of these absolute errors are considered to be small in comparison to the small scale and broad level of the capability information.

The CLI Soil Capability for Agriculture methodology was developed during socioeconomic conditions prevalent during the 1960's and was based on the state of the art of agricultural resource evaluations in the 1960's. This situation may or may not be comparable to conditions in the 1980's. Moreover, the inventory did not use an objective value-free biophysical base and different groups of analysts were involved in preparation of the inventory in different geographic areas of the province. Although federal soil survey personnel were responsible for the southern half of the province and provincial soil survey personnel classified the northern half, there was close correlation of approaches. At the time the CLI Capability for Agriculture classification was conducted controversy arose as to whether the best land in the Peace River region (classified by provincial soil survey personnel) should be classed 1 or 2 and also as to the location of the boundary between 2H and 3H agroclimatic zones (T.W. Peters, W.W. Pettapiece pers. comm.). The choice was made to classify much of this land as agroclimatic area 2H (Bowser 1967) as shown in Figure 2. More recent information on crop productivity (Peters and Pettapiece 1981), the degree and number of limitations (C. Van Waas, pers. comm.)[1] and the tendency toward short growing season crops such as rapeseed and barely

1. T.W. Peters, W.W. Pettapiece and C. Van Waas have extensive experience in conducting soil surveys and evaluating agricultural capability in the Peace River Region.

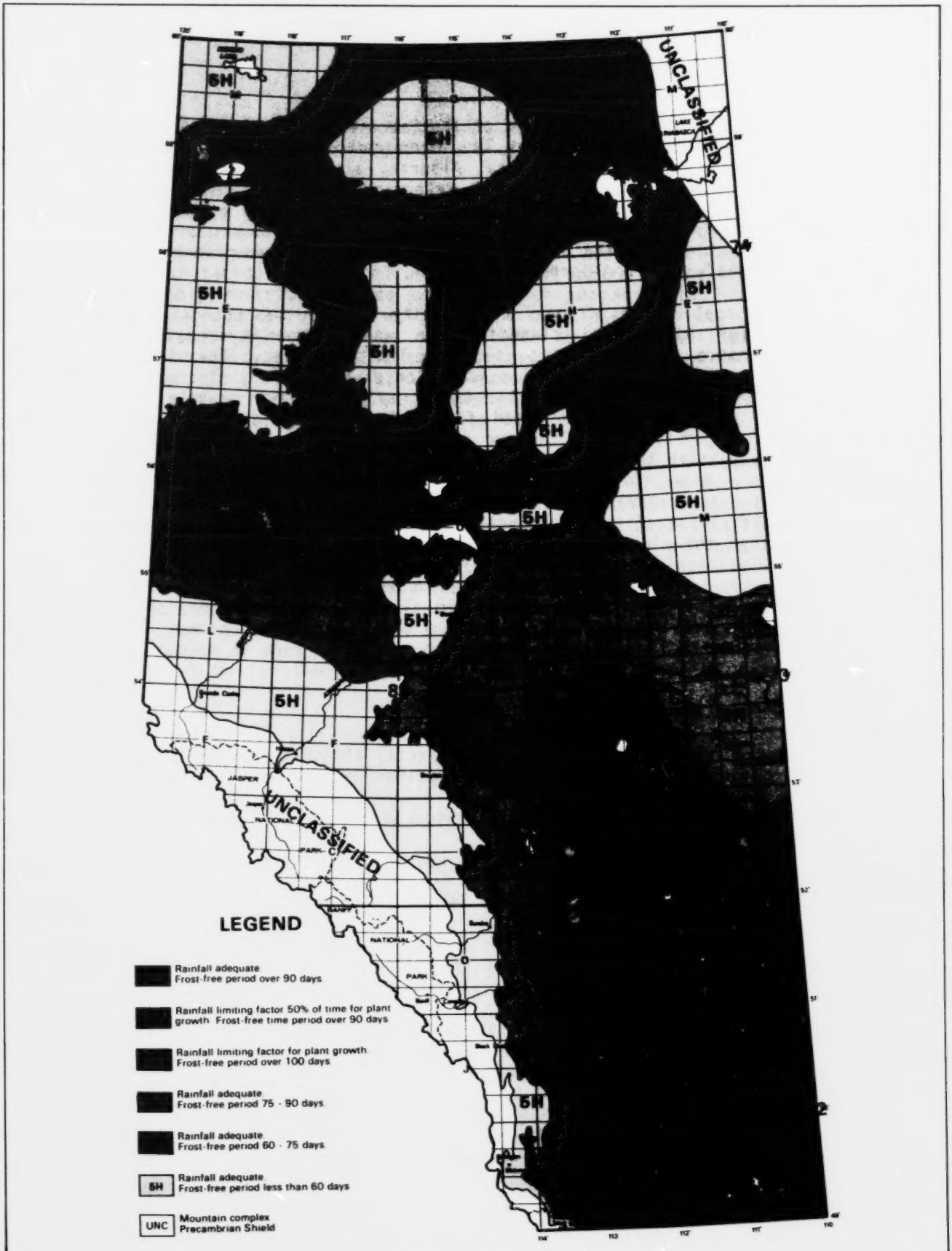

Fig. 2 AGROCLIMATIC AREAS OF ALBERTA

(Faris 1981), suggest that much of the Peace River that was classed as 2H, should have been classed as 3H. Crop yields in the Peace River 2H are not as high as 2H in central Alberta, although some local small areas of high yields do exist (T.W. Peters, pers. comm.). This controversy can be attributed to the subjective nature of many of the interpretations made in the inventory. In any case it is now realized that the Peace River region has a very different crop environment from central and southern Alberta.

The application of crop productivity data in the CLI Soil Capability for Agriculture classification was neither systematic nor comprehensive although it was used to a limited degree. The classification was intended to be a classification of the variety of crops that could be succesfully grown rather than crop yield. For example, class 1 land in Alberta can be used for market gardening, wheat, oats, barley, rye, oilseeds, or tame or native forages, whereas class 5 land can only sustain tame or native forage. In other words, the lower the class, the fewer the cropping options. Some users of CLI Soil Capability for Agriculture data have incorrectly charged that it was simply a classification of wheat production. Although such a bias could have crept into the classification, this was not the intention. There is some relationship between the CLI capability class and productivity, but the two terms were never intended to be synomynous. There is also much diversity of productivity within classes. For example, productivity of cereal grains in southern Alberta agroclimatic area 2H is greater than 2H land in central Alberta, which in turn is more productive than 2H land in the Peace River region (Peters and Pettapiece 1981).

CLI was a classification of physical capability and made a number of assumptions, many of which could directly affect the suitability and productivity of the land. These assumptions were:

1. Shrubs and trees are not considered limitations unless it is impossible to remove them.
2. The soils will be cropped under mechanized systems with good management practices.
3. The system does not classify limitations that can be overcome by the farmers.
4. Distance to market, kinds of roads, location, size of farm, characteristics of land ownership, cultural patterns and skill or resources of the farmer (Brocke 1977) were not considered.

Another very important point to remember when using CLI inventories is the fact that they were never intended to be, and neither can they be, compared between sectors. For example, CLI Forestry Class 3 land does not have the same socioeconomic benefit as CLI Agriculture class 3, and CLI Recreation was based on density of use rather than diversity which was the basis of the Agriculture classification. CLI was never intended for use as the sole input to the resource planning

process, it was recognized that other ecological, socioeconomic and resource information is required in any planning exercise.

In summary, CLI Soil Capability for Agriculture data should not be used without a full understanding of its objectives and design. CLI was designed to paint a picture of national and regional capabilities; it was not intended for use at detailed or site specific scales because of the limitations associated with the broad nature of the fieldwork, cartographic restrictions and complexity of mapped units. Although some crop productivity data were used in the classification, CLI Soil Capability for Agriculture was not intended to be a classification of crop productivity. According to W.E. Rees (1977, p. 17), each capability map can be described as an independent, static representation of an only more or less objective assessment of the land resource for a single purpose at a particular point in time.

In conclusion, CLI Soil Capability for Agriculture is a reasonably reliable and adequate data base to construct a broad overview of agricultural capability in Alberta, despite reservations concerning the system discussed above. It is based on soil and climate data relevant to agriculture and is the only data base that has a broad enough coverage to be used in this agricultural capability analysis. Information such as crop productivity data and more detailed ecological land classification data which has recently become available could possibly now be used in conjunction with the CLI data to provide an even better broad picture of agricultural capability in Alberta.

5. SUMMARY OF CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA IN ALBERTA

Table 1 compares the various CLI capability classes to the types of farming most widely practised in Alberta. It is very important to keep this table in mind when discussing agricultural capability in Alberta. In most cases class 4 or better land is considered to be potentially arable while class 5 and better is considered to be potentially suitable for improvement. CLI class 4 land is considered to be marginal for agriculture which is interpreted as meaning that some class 4 land is capable and some is not. This land is transitional between good agricultural land and non-arable land. Class 4 land can form a viable and important component in a farming operation, but its suitability is often controlled by non-physical factors such as transportation, access, expectations of the farmer and availability of off-farm employment.

This report presents only part of the information that might be used to define the physical boundary for the agricultural land base. It must also be noted that the thrust of this paper is toward defining the potential for agricultural expansion on public land, but this problem can not be addressed in isolation from the agricultural capability of the province as a whole.

Table 1

A COMPARISON OF CLI SOIL CAPABILITY FOR AGRICULTURE CLASSIFICATION AND TYPES OF FARMING

Grain and Mixed Farming	Livestock Farming
Best land - class 1	Good land - 1, 2, 3 (wide range of forage and feed crops and pasture can be managed on these lands)
Good land - class 2 and 3	
Marginal land - class 4	Marginal land - 4 (a narrower range of forage and feed crops can be grown, but productivity for some crops on some class 4 land can be high, also capable for pasture)
No capability - class 5, 6, 7 and 0	Perennial forage and pasture - 5
	Pasture - 6
	No or little capability - 7, 0

5.1 A Comparison of CLI Agricultural Capability Data Between Alberta and Other Provinces

With almost 0.8 million hectares of class 1 land, Alberta ranks third behind Saskatchewan and Ontario. Ontario has almost three times the area found in Alberta (Table 2). Alberta is second in area of both class 2 and 3 land ranking behind Saskatchewan in each class. Alberta has by far the largest area of class 4 land in the country, with 40% of the national total or 9.3 million hectares. Alberta has almost as much class 4 land as it does class 1, 2 and 3 combined. As can be seen from Table 3 more than 14 per cent of the total provincial area has been classed as class 4 land. By definition these soils have such severe limitations that they are only suited for a narrow range of crops and the risk of crop failure is high (Brocke 1977). Even with high inputs of management (e.g. soil conservation and fertilizer application) these soils generate low to medium yields.

Consequently, much of this class 4 land is located on the physical borders of tilled cropping. This large expanse of marginal or borderline agricultural land causes problems in attempting to strictly define the agricultural land base.

As summarized in Tables 3 and 4 Alberta has a relatively large land base of both good and marginal agricultural land compared to other provinces.

Table 2

AREAS OF CLI SOIL CAPABILITY FOR AGRICULTURE CLASSIFICATIONS BY PROVINCE
(1 000s of hectares)

Province	1	2	3	4	5	6	7	Organic Soils (O)	Unclass. Land in CLI Area
Newfoundland[1]	-	-	-	-	-	-	-	-	-
Prince Edward Island	0	262	142	50	76	0	28	7	0
Nova Scotia	0	166	983	425	82	14	3 513	116	0
New Brunswick	0	161	1 153	2 035	1 702	12	1 841	133	115
Quebec	20	910	1 282	2 587	1 661	11	20 765	1 529	1 465
Ontario	2 158	2 219	2 912	2 628	1 917	1 141	11 230	2 565	782
Manitoba	163	2 532	2 442	2 393	2 240	2 087	1 035	4 451	1 950
Saskatchewan	1 001	5 878	9 427	3 786	8 529	2 922	36	1 777	1 127
Alberta	787	3 842	6 115	9 292	11 109	3 937	4 195	5 997	2 658
British Columbia[1]	-	-	-	-	-	-	-	-	-
NWT and Yukon[2]	-	-	-	-	-	-	-	-	-
CANADA[3]	4 128	15 970	24 455	23 195	27 316	10 124	42 657	16 575	8 098

1. Data not available at time of publication.
2. Not covered by CLI.
3. Does not include British Columbia, Newfoundland, Northwest Territories or Yukon.

Source: After Environment Canada 1976.

Table 3

PERCENTAGE DISTRIBUTION OF CLI SOIL CAPABILITY FOR AGRICULTURE CLASSIFICATIONS
(percentages)

Province	1	2	3	4	5	6	7	0	Unclass'd	Outside CLI	Total Provincial Land Area
Newfoundland[3]	0.	0.	.01	0.2	1.0	7.8	10.1	9.3	0.	71.6	100
Prince Edward Island	0.	46.4	25.1	8.8	13.5	0.	4.9	1.2	0.	0.	100
Nova Scotia	0.	3.1	18.6	8.0	1.6	0.2	66.3	2.2	0.	0.	100
New Brunswick	0.	2.3	16.1	28.5	23.8	0.2	25.7	1.9	1.6	0.	100
Quebec	0.01	0.6	0.9	1.9	1.2	.01	15.3	1.1	1.1	77.9	100
Ontario	2.4	2.5	3.3	2.9	2.1	1.3	12.6	2.9	0.9	69.1	100
Manitoba	0.3	4.6	4.4	4.4	4.1	3.8	1.9	8.1	3.6	64.8	100
Saskatchewan	1.8	10.3	16.5	6.6	14.9	5.1	0.1	3.1	2.0	39.6	100
Alberta	1.2	6.0	9.5	14.4	17.2	6.1	6.5	9.3	4.1	25.7	100
British Columbia	-	-	-	-	-	-	-	-	-	-	-
Yukon[4]	-	-	-	-	-	-	-	-	-	-	-
NWT[4]	-	-	-	-	-	-	-	-	-	-	-
CANADA[3]	0.5	1.8	2.8	2.7	3.0	(----------89.2----------)					100

1. Includes urban areas, national parks, military reserves not included in CLI.
2. All areas outside CLI boundaries (mostly 6, 7 and 0).
3. Estimated from CLI maps not published.
4. Not included in CLI area.
5. Adjusted for estimates.

Source: After Environment Canada (1976).

Table 4

DISTRIBUTION OF CANADA'S AGRICULTURAL LANDS[1] BY CLI
SOIL CAPABILITY FOR AGRICULTURE BY PROVINCE

Province	Class 1 (Best Land)		Classes 1 to 3 Total (Good Land)		Classes 1 to 5 Total	
	1000s hectares	%	1000s hectares	%	1000s hectares	%
Newfoundland[2]	-	-	-	-	-	-
Prince Edward Island	0	0	403	0.9	529	0.5
Nova Scotia	0	0	1 150	2.6	1 656	1.6
New Brunswick	0	0	1 314	2.9	5 051	5.3
Quebec	20	0.5	2 219	5.0	6 460	6.8
Ontario	2 158	52.3	7 289	16.4	11 834	12.5
Manitoba	163	3.9	5 137	11.5	9 770	10.3
Saskatchewan	1 001	24.2	16 305	36.6	28 620	30.1
Alberta	787	19.1	10 744	24.1	31 145	32.9
British Columbia[2]	-	-	-	-	-	-
Yukon and NWT	-	-	-	-	-	-

1. Canada's land capable of sustaining improved agriculture. Class 1 is the best land. Classes 1 to 3 can be classified as good crop land. Classes 1 to 5 include all land capable of sustaining any improved agriculture.
2. Area of classified land excludes British Columbia, Newfoundland and regions of other provinces outside of CLI boundaries. Inclusion of these areas would make a very small difference in percentage.

Source: After Alberta Environment (1976)

5.2 Agroclimatic Areas and Crop Yields in Alberta

Bowser's map (1967) was used by the Canada Land Inventory as the base level or starting point in applying the capability rating system (Figure 2). The agroclimatic areas identified on this map have similar climatic characteristics for cropping purposes based on frost free period, moisture and heat units. Subclass A denotes a deficiency of moisture, while subclass H denotes a deficiency of heat as the limiting factor. Agroclimatic area 1 has adequate precipitation and a long enough frost free period to permit the growth of all dry land crops normally grown in the prairie provinces. In agroclimatic area 2A heat is adequate but low precipitation is a limiting factor, and in 3A low precipitation is a severely limiting factor. In agroclimatic area 2H frost is a limiting factor, though moisture is adequate, while in 3H frost is a severely limiting factor, and in area 5H the growing season is so short only hay crops are recommended.

The agroclimatic areas do not have sharp, well defined boundaries. The map should only be used as a broad representation of agroclimatic resources in the province. There are also large variations of climatic parameters within the individual agroclimatic areas.

Table 5 shows the average yields of wheat, oats and barley in the various agroclimatic areas as a percentage of yields in agroclimatic area 1. Agroclimatic area 1 has the highest yield of wheat decreasing to 2A and 3A, and to 2H and 3H. For oats and barley, however, 1, 2A, 2H and 3H (south and central Alberta) have similar yields, with 3A and Peace River 2H and 3H showing yields 25 per cent to 50 per cent lower. Crop yields in the Peace River 2H and 3H agro-climatic areas tend to be as much as 50 per cent lower than 2H and 3H in central and southern Alberta. This supports the opinion that in terms of crop yields CLI overestimated the agricultural capability in much of the Peace River region as discussed in Chapter 4 of this report.

Table 5
AVERAGE YIELD* OF WHEAT, OATS AND BARLEY
IN DIFFERENT AGRO-CLIMATIC AREAS OF ALBERTA

	Southern and Central Alberta					Peace River	
	1	2A	3A	2H	3H	2H	3H
Wheat	100	89	60	85	72	71	55
Oats	100	95	67	97	112	76	60
Barley	100	102	62	92	95	65	65

* As a percentage of yield in agroclimatic area 1.
Source: After Peters and Pettapiece (1981).

5.3 Agricultural Capability in the Green, Yellow and White Areas

Figure 3 shows the Green, Yellow and White Areas of the province which have been delineated for the purpose of public land administration. The White Area corresponds to the area of the province which was settled first and where agriculture is the most extensive land use. The Yellow Area is, in a sense, an area of transition from forested public land to privately owned agricultural lard. Agriculture is extensively practised and considerable portions of public land are still available for agricultural disposition. The Green Area corresponds to the forested non-settled land where agriculture other than grazing is restricted. These boundaries are continuously being reviewed both at the local level when applications for public land are received by Public Lands Division, Alberta Energy and Natural Resources and, in a more systematic comprehensive manner, through broader integrated resource planning projects.

Table 6 summarizes Soil Capability for Agriculture data in each of the Green, Yellow and White Areas. With almost 8 million hectares of class 1, 2 and 3 land, the White Area contains by far the most good agricultural land in the province. The Yellow Area contains about 2.1 million hectares of class 2 and 3 land, while about 0.5 million hectares of class 2 and 3 land remain in the Green Area. Generally, class 2 and 3 land is spread over a large portion of the Green Area and is found in conjunction with land units of lower capabilities. In many cases areas of good land are not in contiguous parcels which often limits their suitability for development.

Table 6

SUMMARY OF CLI SOIL CAPABILITY FOR AGRICULTURE
DATA IN THE GREEN, YELLOW AND WHITE AREAS
(millions of hectares)

	Green Area	White Area	Yellow Area	Total	
1	0.0	0.7	0.0	0.7	>Good Agriculture Land
2	0.02	3.2	0.8	4.0	
3	0.4	4.6	1.3	6.3	
4	3.9	5.0	1.1	10.0	>Marginal Agric. Land
5	7.6	4.2	0.3	12.1	No or Little Agricultural Capability
6	1.3	1.6	0.1	2.9	
7	3.9	0.2	0.4	4.5	
0	3.5	0.6	0.3	4.5	
Unclassified or Other	18.4	0.8	0.0	19.2	

Fig. 3 PUBLIC LANDS CLASSIFICATION

The Green Area contains almost 4 million hectares of class 4 land which is a significant proportion of the provincial total. These class 4 soils are different from class 4 soils in the White Area. A major limitation of the class 4 land in the Green Area is poor soil structure and poor drainage, while limitations in the White Area are commonly due to topography, coarse texture or poor drainage. Furthermore, much of the class 4 land in the White Area is located in agroclimatic areas 1, 2A and 2H which are inherently more productive than the agroclimatic area 3H and 5H found in the Green Area (Table 5). Class 4 land in the White Area is frequently found in conjunction with class 1, 2 or 3 land, while in the Green Area class 4 land is most frequently found with class 5, 6 and 7 soils. Consequently, in the White Area of the province, class 4 land can make an integral contribution to the total operation of a farm unit when other portions are higher than class 4. It is a different situation, however, if an entire farm unit is made up of class 4 or lower land which would be the case in the Green Area where there is very little 2 and 3 land (Table 6).

5.4 Potential for Expanding the Agriculture Land Base onto Public Land

Potential is defined, for the purpose of this analysis, as the land area with a capability for agriculture minus the area presently used for agriculture. This value must be considered as a maximum value because certain portions of the potential are simply not suitable. That is to say they may be committed to another use, or access, markets or other external factors can restrict their use.

5.4.1 Green Area

Agriculture other than grazing is restricted in the Green Area. Hence, for the purpose of this paper, potential is equal to capability in the Green Area. There are about 250 000 hectares (Alberta 1981a) utilized for grazing in the Green Area, about 100 000 of which are in the Peace River Region. Thus, opening of land in the Green Area presently under grazing disposition would be considered intensification rather than expansion.

There are about 0.4 million hectares of class 2 and 3 land in the Green Area of Alberta. The majority of this good agricultural land is located in the Peace River Region along the Green/Yellow Area boundary (Figure 4). In addition the Green Area contains an additional 3.9 million hectares of class 4 land (Figure 5) which has a much wider distribution.

Table 7 lists administrative units with a portion of the Green Area containing more than 100 000 hectares of class 4 or better land. Improvement Districts (ID) 16 and 17 (Figure 6) contain more than 50 per cent of the total class 2 and 3 land located in the entire Green Area. Both ID 17 and ID 23 have more than 1 million hectares of public land classed as 4 or better. Table 8 lists Forest Management Units (Figure 7) that have more than 100 000 hectares of CLI class 4 or better land in the Green Area. The forests that have the largest amounts of undeveloped class 4 or better land are Grande Prairie, Footner, Peace River, Slave Lake and Whitecourt Forests. Forest Management Units G5, southeast of Grande Prairie, and P4, northeast of Peace River, contain the largest areas of class 2 and 3 land remaining in the Green Area.

Alberta Agriculture (Marciak n.d.) has utilized these Forest Management Unit data to conduct a preliminary examination of the potential for agricultural expansion into the forested regions of Alberta. Based on an examination of soil surveys, approximately 30 to 50 per cent of the land areas classed as 4 or better in the High Level, Ft. Vermilion, Peace River, Slave Lake, Grande Prairie and Whitecourt areas is not suitable for tilled cropping because of soil, topography or access problems. Tabular data from this study is reproduced in Appendix 3, Tables 18 to 23.

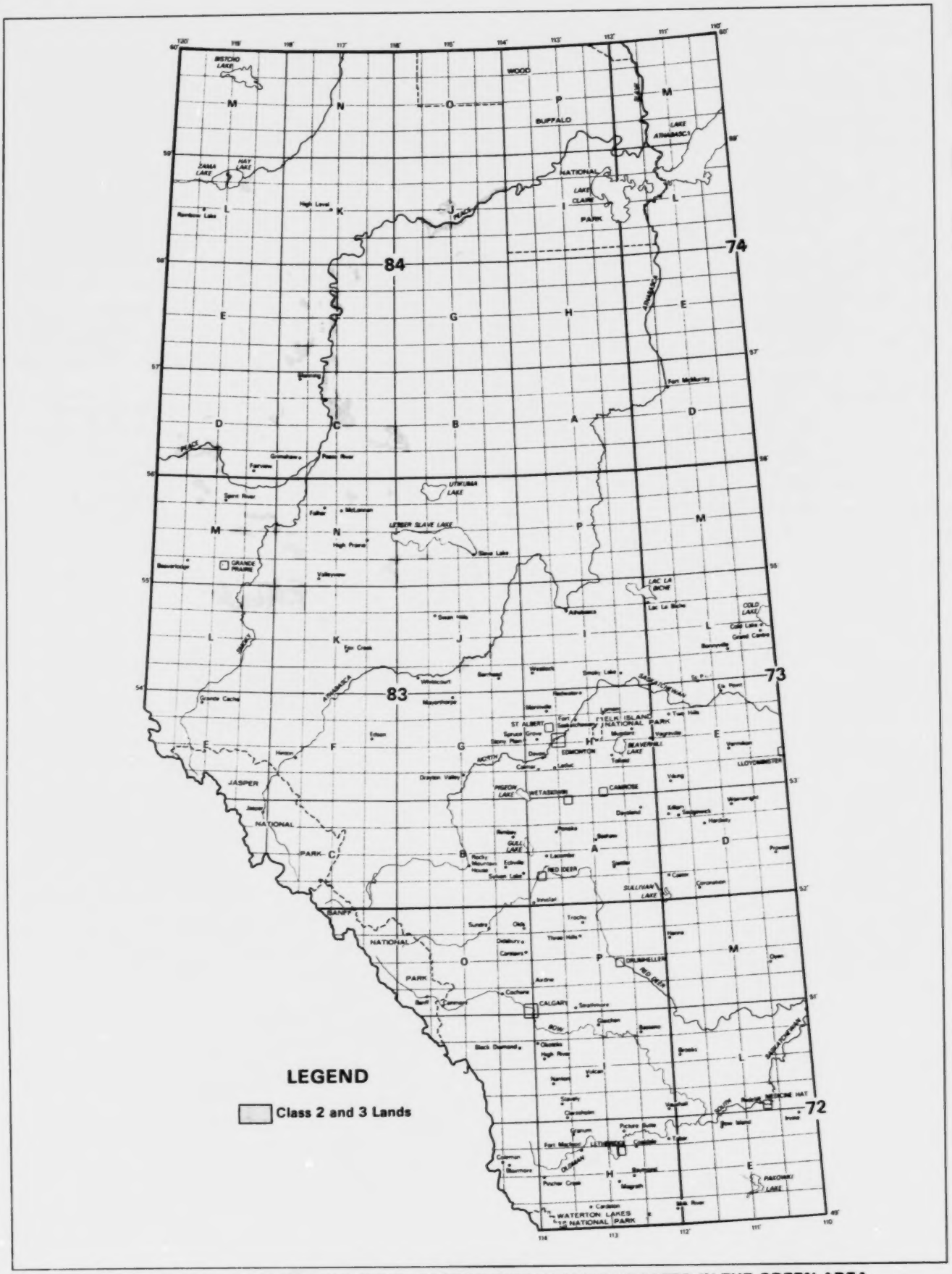

Fig. 4 CLI SOIL CAPABILITY FOR AGRICULTURE. CLASS 2 AND 3 LANDS LOCATED IN THE GREEN AREA.

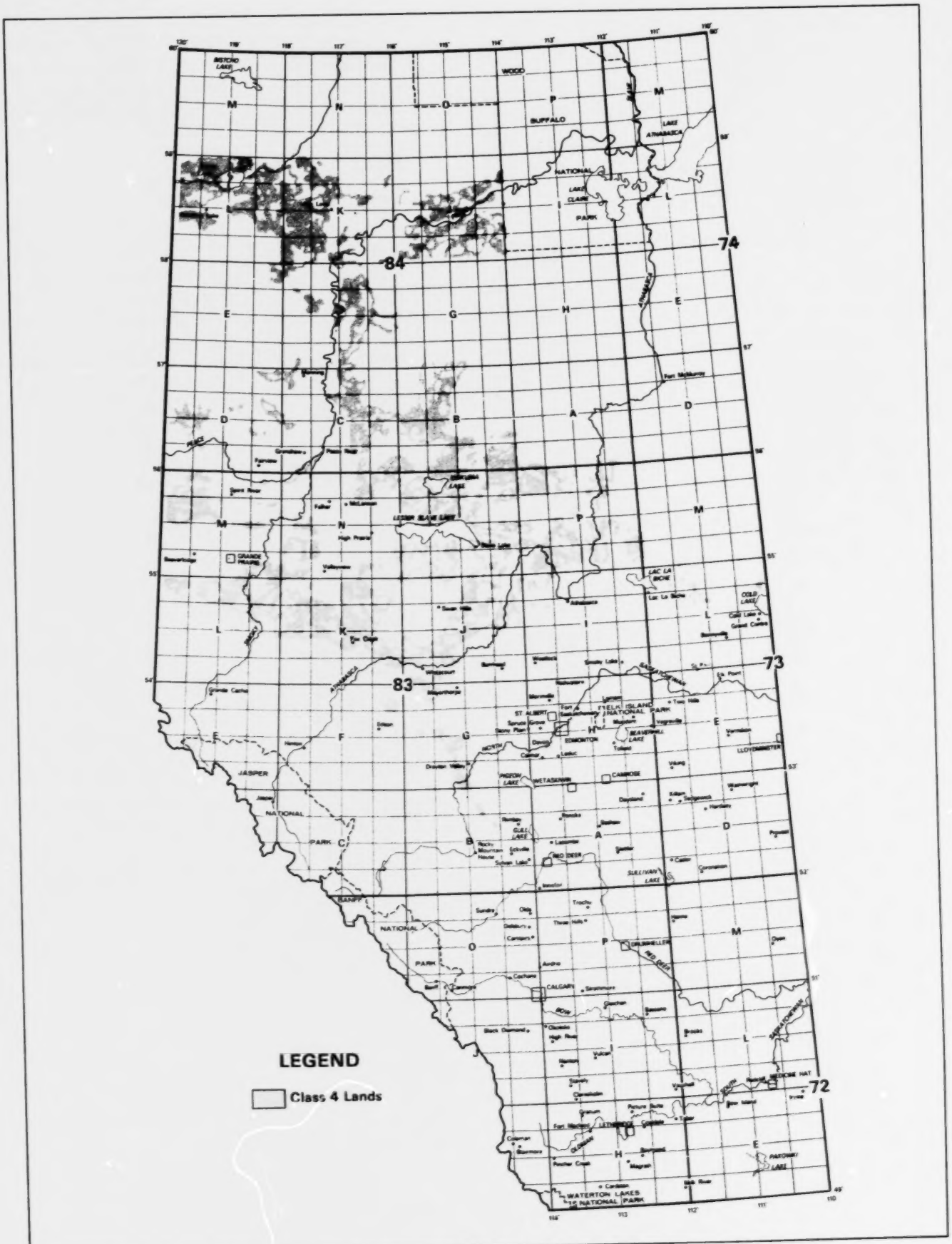

Fig. 5 CLI SOIL CAPABILITY FOR AGRICULTURE. CLASS 4 LANDS LOCATED IN THE GREEN AREA.

Table 7

ADMINISTRATIVE UNITS WITH LARGE AREAS OF
CLI SOIL CAPABILITY FOR AGRICULTURE CLASS
2, 3 AND 4 IN THE GREEN AREA
(1000s hectares)*

Administrative Unit AAU	CLI class 2 - 3	4	5	6	Total area land in AAU
ID 15	9 (2%)	287 (7%)	252 (3%)	65 (5%)	824
ID 16	118 (24%)	667 (17%)	731 (10%)	118 (9%)	3 491
ID 17	161 (32%)	1 495 (39%)	1 645 (22%)	114 (2%)	7 118
ID 20	32 (7%)	110 (3%)	87 (1%)	13 (1%)	595
ID 23	69 (14%)	1 042 (27%)	2 708 (36%)	188 (3%)	8 414

* Values in brackets are percentages of the class total in the Green Area.

Note: See Appendix 2 for a map of AAU's and complete tables of data.

Fig. 6 MUNICIPALITIES (ALBERTA ADMINISTRATIVE UNITS)

Table 8

FOREST MANAGEMENT UNITS WITH LARGE AREAS OF
CLI SOIL CAPABILITY FOR AGRICULTURE CLASS
2, 3 AND 4 IN THE GREEN AREA
(1000s of hectares)

Forest Management Unit FMU	CLI Class 2 - 3	4	5	6	Total area of land in FMU
Footner Lake Forest:					
F1	10.5	102.3	154.6	11.6	391.9
F4	2.9	104.4	89.7	6.6	292.1
F12	.7	118.5	92.7	9.9	308.5
F14	3.0	119.4	73.4	21.1	301.2
F15	1.3	113.9	105.1	---	266.5
F01	2.8	116.7	48.6	46.4	789.6
Grande Prairie Forest:					
G1	12.6	99.1	77.8	12.3	223.2
G5	32.9	99.3	14.7	29.2	217.2
G5C	1.0	106.1	39.7	5.3	228.3
Peace River Forest:					
P3	19.1	101.2	68.4	5.0	285.9
P4	65.5	95.7	24.3	8.7	382.2
Slave Lake Forest:					
S3	11.3	92.7	20.9	1.1	146.8
S5	----	123.7	182.5	5.7	409.3
S6	1.7	162.3	47.4	---	253.1
S10	16.0	150.3	91.3	5.1	396.9
Whitecourt Forest:					
W2	----	113.5	57.4	14.7	223.3
W3	1.2	135.4	189.6	13.4	393.4
W4	1.1	128.0	178.9	16.7	350.1

Note: See Appendix 3 for a map of FMU's and complete tables of data.

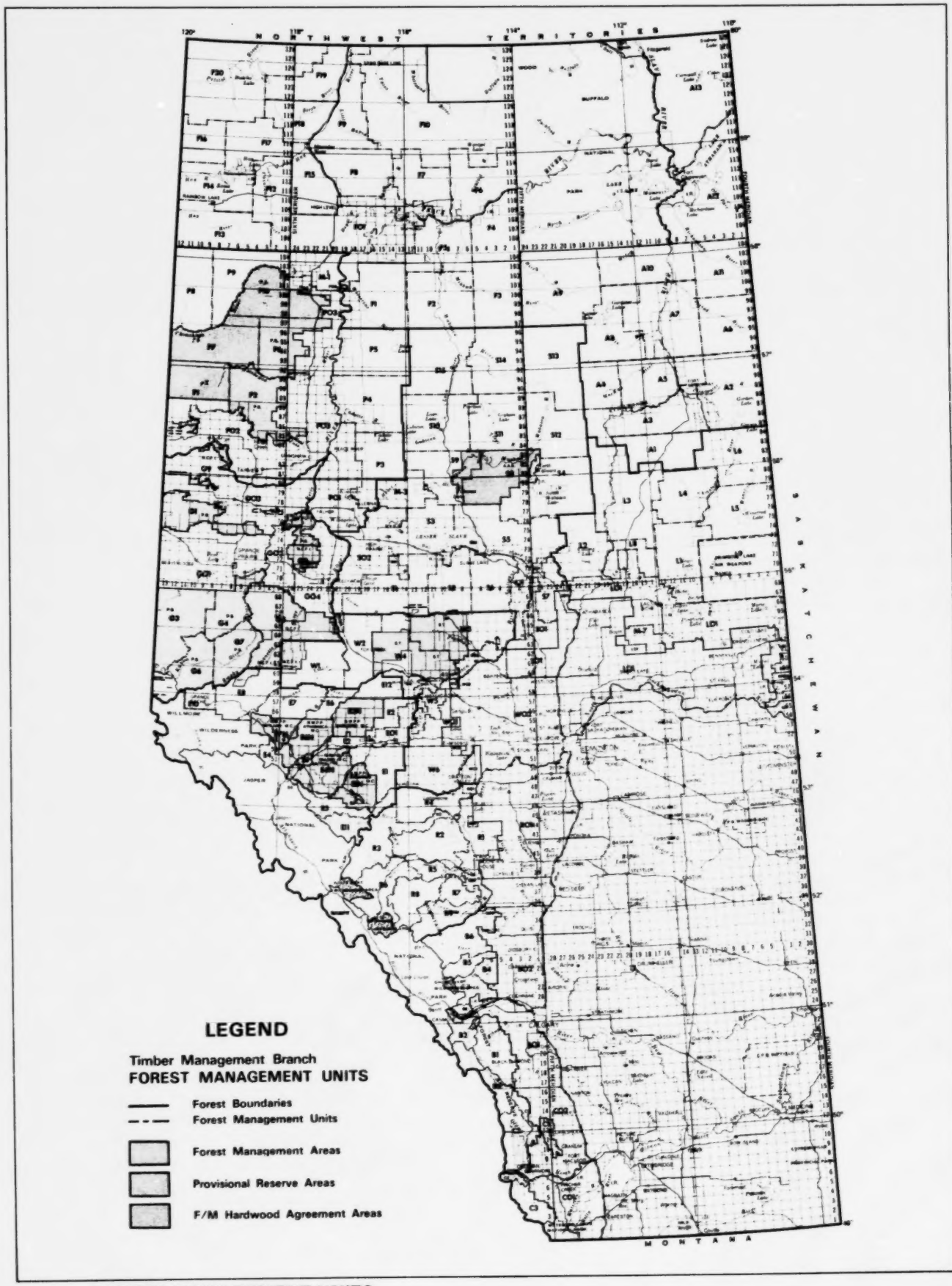

Fig. 7 FOREST MANAGEMENT UNITS

Information from Table 8 is useful in identifying those areas in the Green Area with the greatest potential for agricultural expansion. Clearly areas of class 2 and 3 land (especially P4 and G5) shown in Figure 2, should receive first priority for further examination for expansion. It is recognized that these units of good land are often small in size and associated with land units of lower capability and therefore require detailed evaluations of capability. CLI class 4 lands should receive secondary attention. Factors such as access, other uses and commitments, demand and markets must be addressed to determine suitability.

5.4.2 Yellow Area

The Yellow Area, corresponding roughly to the Peace River area of northwestern Alberta, contains 4.3 million hectares of land. Of this total 3.2 million hectares have been classified as CLI 2, 3 or 4 (see Section 5.3). Since 1976 the agricultural land base in the Yellow Area, consisting of patented land, public land under agricultural disposition leading to title and public land under agricultural disposition not leading to title, contained 2.5 million hectares (Canada 1978). Between 1976 and 1981 there was a net increase in the agricultural land base of 0.1 million hectares (Birch 1982)[1]. Most of this 2.6 million hectares is CLI class 2, 3 or 4. However, it is not known what the actual percentages are.

Birch's (1982) study determined that 30 per cent of the additions to the agricultural land base in the Yellow Area between 1976 and 1981 was class 5 or lower. This reflects the fact that undeveloped class 4 or better land is no longer found in large continuous or homogeneous units. Much of the remaining vacant public land base in the Yellow Area is found in complex units with land of lower capability. Assuming the 30 per cent class 5 or lower was consistent since land was first opened in the Yellow Area, 1.8 million hectares of the present land base would be class 4 or better (70 per cent of 2.6 million). This trend toward large areas of low capability is a recent one, however, and the present agricultural land base may contain as many as 2.5 million hectares of CLI class 2, 3 or 4 land. We can therefore assume that the present agricultural land base contains between 1.8 and 2.5 million hectares of CLI class 2, 3 and 4 land. Subtracting these numbers from the 3.2 million hectares of CLI class 2, 3 and 4 land known to exist in the Yellow Area, gives an estimate of 0.7 to 1.4 million hectares of CLI 2, 3 and 4 land in the Yellow Area not being used for agriculture. Table 9 summarizes this information.

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1. 1981 census data are now available. There are, however, some problems with the data as the 1981 questionnaire was changed from the 1976 questionnaire (C. Sterling, pers. comm.). The method of adjusting the 1976 data with Birch's (1982) data therefore provides the best estimate of the present agricultural land base.

Table 9

CLI CLASS 2, 3 AND 4 LAND IN THE YELLOW AREA THAT IS NOT PRESENTLY USED FOR AGRICULTURE

Status and Capability	Million Hectares
CLI class 2, 3 and 4 land in the Yellow Area	3.2
CLI class 2, 3 and 4 land in the present agricultural land base in the Yellow Area	1.8 to 2.5
CLI class 2, 3 and 4 land in the Yellow Area presently not used for agriculture	0.7 to 1.4

The majority of those 0.7 to 1.4 million hectares is public land, but a portion is privately owned. For example, from 1976 to 1981 about 12 000 hectares of agricultural land in the Yellow Area was converted to non-agricultural uses such as non-agricultural subdivisions, urban annexations and roads (Birch 1982). For the purposes of this study it is assumed there are 0.7 to 1.4 million hectares of public land in the Yellow Area that is not presently being used for agriculture.

These numbers must be considered in the proper context. The class 2, 3 and 4 public land that remains undeveloped for agriculture in the Yellow Area is found for the most part in complex units with non-arable land. Individual units may be very small, inaccessible, under other commitment or otherwise not suitable for development. The suitability of this land for agriculture must therefore be assessed on a detailed site specific basis. CLI data can only be used to direct investigations at lower levels of detail on which decisions can be made.

5.4.3 White Area

The White Area corresponds to the mostly patented agricultural land area of the southeast portion of the province. It contains 21.0 million hectares of land of which 13.5 million hectares are CLI class 1, 2, 3 or 4 (Section 5.3). The present agricultural land base in the White Area contains 17.7 million hectares of land (based on 1976 census data and adjusted using Birch 1982). This includes patented agricultural land and public land under agricultural disposition. More than 4 million hectares of the present agricultural land base in the White Area is class 5 or lower. A large portion of this non-arable land is used for grazing.

The present agricultural land base in the White Area contains about 2.5 million hectares of public land under agricultural disposition. There is an additional 2.5 million hectares of public land in the White Area that is not under agricultural disposition. Much of this land is under disposition or commitment to uses other than agriculture. It is not possible at this time to document the agricultural capability of this land and therefore not possible to estimate the potential for expansion. An inventory of the agricultural capability of these lands would be extremely useful.

Table 10 summarizes agricultural capability of the agricultural land base and status of public land in the White Area.

Table 10

SUMMARY OF STATUS AND AGRICULTURAL CAPABILITY OF LAND IN THE WHITE AREA

Status and Capability	Million Hectares
Land area of the White Area	21.0
Present agricultural land base in the White Area	17.7
CLI class 1-4 land in the White Area	13.5
CLI class 5-7 land in the present agricultural land base of the White Area	>4.2
Public land under agricultural disposition in the White Area	2.5
Public land in the White Area not under agricultural disposition	2.5

5.4.4 Agricultural Expansion in the Peace River Region

The Peace River Region (Figure 8) is one of six regions established by Alberta Energy and Natural Resources. Agricultural expansion onto public land in this region is a major resource management concern. This area was the last portion of the province to be opened for agriculture. It is still viewed as having the greatest potential because most of the class 2, 3 and 4 land found in the Green Area exists in the region and the Yellow Area still contains some class 4 or better public land that could be opened for agriculture. Between 1976 and 1980 the Peace River Region accounted for 75 per cent of the total additions to the agricultural land base (Birch 1982). During the same period additions to the total agricultural land base averaged approximately 19 000 hectares annually.

Except for some small areas of land along the Athabasca River in the Whitecourt-Barrhead area, all of the class 2 and 3 land remaining in the Green Area, or about 0.4 million hectares, is found in this region. The region also contains 2.9 million hectares of the 3.9 million hectares of class 4 land found in the Green Area. Grande Prairie and Peace River Forests (Table 11) contain most of the class 2 and 3 land. Most of the class 3 and 4 land in the region is located in agroclimatic area 3H. Average wheat, oats and barley yields in this area are 20 to 25 per cent lower than yields in the region's 2H agroclimatic area (see Section 5.2). Another aspect of the agricultural capability in the Peace River Region is the fact that a major soil limitation is poor drainage due to soil structure. Peters and Pettapiece (1981) have found that of all subclasses this limitation appears to have the greatest detrimental effect on wheat, oats and barley yields. Most of agroclimatic area 2H, and therefore the best agricultural land, in the Peace River Region has already been opened for agriculture.

Sources of good agricultural land suitable for addition to the agricultural land base are dwindling. This is in part reflected by the fact that from 1976 to 1980 almost one-third of additions to the agricultural land base in the Peace River Region was non-arable (class 5 or lower). Furthermore, only 25 per cent was class 2 and 3, or good agricultural land (Table 12).

If additions to the agricultural land base are to continue at the rate they have in the past the ratio of marginally arable or non-arable land to good agricultural land will increase. This is because the better agricultural land in the Green Area Yellow Area that is available is not found in large homogeneous units, but, rather, good land is found in small and often complex units in association with land of lower capability.

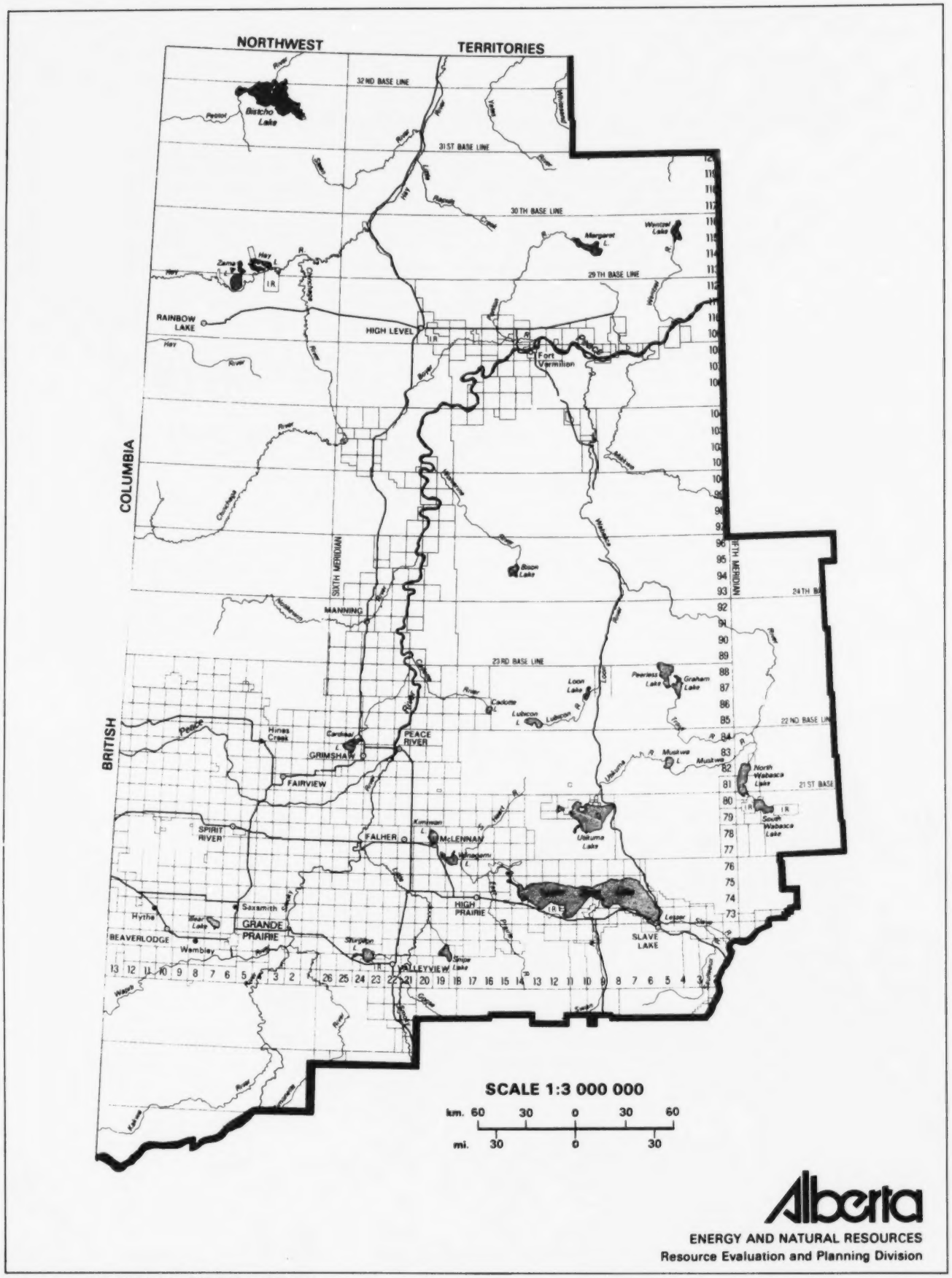

Fig. 8 THE PEACE RIVER REGION

Table 11

SUMMARY OF CLI AGRICULTURE CAPABILITY
DATA FOR THE PEACE RIVER REGION
(hectares)

Forest	Yellow Area		Green Area	
	2 + 3	4	2 + 3	4
Grande Prairie Forest	925 118	287 064	155 851	424 419
Slave Forest	235 151	122 202	46 607	1 043 681
Peace River Forest	803 150	374 325	149 482	377 246
Footner Forest	100 301	247 087	63 210	958 860
Metis Colonies	27 395	103 871	9 145	114 441
TOTAL	2 091 115	1 134 549	424 295	2 918 647

Table 12

ADDITIONS TO THE AGRICULTURAL LAND BASE IN THE
PEACE RIVER REGION BY CLI CLASS, 1976-1980

	Estimated CLI class									
	1	2	3	4	5	6	7	0	Undetermined	Total
Public Land Dispositions (1000s ha)	0	2.9	28.1	59.1	12.9	0.5	1.3	6.7	1.8	113.3

Source: Birch 1982

5.4.5 Summary

Table 13 summarizes the areas of public land in the Green, Yellow and White Areas classified as CLI 4 or better and not presently under agricultural disposition.

By far the greatest potential for expansion is the Green Area. Preliminary investigations (Marciak n.d.) have shown that 30-50 per cent of this potentially arable land in the Green Area is not suitable because of access, complexity of units, drainage requirements and other limitations. This points to the need for detailed evaluations of agricultural capability and suitability for development.

Based on Figure 4 and Table 8 the areas which have the largest areas of class 2 and 3 land are southeast of Grande Prairie and the Manning-Cadotte Lake area.

Table 13

AREAS OF CLI CLASS 4 OR BETTER PUBLIC LAND UNDEVELOPED FOR AGRICULTURE IN THE GREEN, YELLOW AND WHITE AREAS (million of hectares)

Green Area	Yellow Area	White Area*	Total
4.4	0.7 - 1.4	?	>5.1

* No information is available to estimate the agricultural capability of public land in the White Area not under agricultural disposition. Of the 2.5 million hectares of public land not under agricultural disposition, there is likely less than 1 million hectares of class 1-4 land.

5.5 Potential for Expanding/Intensifying Agriculture on the Present Agricultural Land Base

Of the 2.6 million hectares presently farmed in the Yellow Area, approximately 1.7 million hectares are improved (1981 census data). This leaves a total of approximately 0.9 million hectares that are unimproved. The White Area's agricultural land base is made up of 10.8 million hectares of improved land and 6.9 million hectares of unimproved land[1]. The entire present agricultural land base therefore consists of 12.5 million hectares of improved land 7.8 million hectares of unimproved land.

The province as a whole contains 20.0 million hectares of CLI class 1-4 land of which 12.5 million hectares is improved agricultural land. Only a small portion of this improved total is class 5 or lower. Therefore there is a minimum of 7.5 million hectares of CLI class 1-4 land that is not improved for agriculture. Table 13 in Section 5.4.5 shows that approximately 5.1 million hectares are located on public land and are mostly not under an agricultural disposition. Subtracting this from the 7.5 million hectares of unimproved class 1-4 land leaves a maximum of about 2.4 million hectares of CLI 1-4 privately owned land that is not improved for agriculture. Table 14 summarizes this information. A considerable portion of this 2.4 million hectares is under uses and commitments other than agriculture, but it can be used as a rough estimate of the maximum area of unimproved class 1-4 land in the present agricultural land base.

Alberta Agriculture has initiated an investigation into the agricultural capability of the unimproved agricultural land base. The results from this study will be extremely useful in assessing the potential for expansion/intensification of the present agricultural land base.

Every year in Alberta approximately 20 per cent of the improved agricultural land base, or about 2.5 million hectares, are summerfallowed during any given crop year (M. Anderson and Associates 1981). This report, prepared for upcoming ECA hearings into the agricultural landbase, investigates the factors that control summerfallow in Alberta and it also makes some projections of summerfallow acreages to the year 2000. The major reasons farmers give for summerfallowing a portion of their land base are: moisture conservation, weed control, nitrogen release, fertilizer savings, fibre incorporation and income stability.

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1. As noted earlier there were some problems with 1981 Census data. It is felt, however, that these problems do not significantly affect the ratio of improved to unimproved land, considering the broad scale at which this paper is aimed.

Table 14

AREAS OF IMPROVED AND UNIMPROVED CLI 1-4 LAND IN ALBERTA

	Million of hectares
Total area of CLI 1-4 land in Alberta	20.0
Total improved agricultural land in Alberta	12.5
Minimum of CLI 1-4 land not improved	7.5
Area of CLI 1-4 public land not under agricultural disposition	>5.1
Unimproved CLI 1-4 land in the present agricultural land base	<2.4

Summerfallow yields are generally more reliable, but there are also a number of disadvantages associated with the practice. Some of these are: increased wind and water erosion, low soil-water storage efficiency, lower water-use efficiency, greater soil-fertility decline and salinity problems under certain soil and management conditions. A controversy has consequently arisen over the practice of summerfallow. On one hand environmentalists and soil scientists argue against the practice while farmers continue summerfallowing. In any case, what the individual farmer feels is best for himself and his land may not be what is best for the public or the agricultural land base as a whole over the long term and may actually do harm.

M. Anderson and Associates (1981) estimate that about 1.0 million hectares of the land summerfallowed yearly could be eliminated. This value must be considered a rough estimate. Although the elimination of summerfallow acreage is a type of intensification, it effectively increases the seeded land base during a given year. It is difficult to predict if the present trend toward a decreasing percentage of summerfallowed land will continue and at what rate, but direct or indirect programs could prove effective in reducing summerfallow practices. Much of this land that is unnecessarily summerfallowed is located in better soil and climatic zones than the large areas of Class 4 land in the Green Area. In addition, infrastructure and transportation already exist for summerfallowed land, but it must be developed for new land in the Green Area. Therefore, actions to expand into the Green Area should be cognizant of other otentials to increase production which may be more efficient.

Another potential to increase/intensify the agricultural land base would be through irrigation expansion. The Water Advisory Committee (1981)[1] states that there are about 5 million hectares of potentially irrigable land in southern Alberta. There are at present about 0.3 million hectares under irrigation, most of which is presently cultivated or used as pasture. There is at present no detailed information on the potential for expansion/intensification of the agricultural land base from irrigation expansion, but detailed inventories have been proposed by the Water Advisory Committee. Expansion of the irrigated land base by about 1.0 million hectares would require extensive water diversion. The actual amount of land that would be suitable is dependent on a wide variety of factors (Alberta 1982).

Much of the land is considered potentially irrigable is classed as non-arable due to aridity, but if the moisture conditions were improved it could then be as productive as CLI 1, 2, 3 or 4 land. This would increase the province's arable land base.

The drainage of potholes, small permanent and semi-permanent sloughs and wetlands exists as a potential for increasing the agricultural capability of land that under natural conditions suffers from excessive moisture. Apedaile and Rapp (1982) have estimated that approximately 1.0 million hectares of land in north central Alberta would be classed as CLI 1, 2 or 3 if they were drained[2]. This study only investigated CLI class 1, 2 and 3 areas it did not investigate class 4, 5 and 6 land which could benefit from drainage. There is likely a larger area than 1.0 million hectares that could benefit from drainage if lower classes and the entire agricultural land base was considered.

Deep plowing is a tillage practice used to overcome structural and chemical problems associated with solonetzic soils. Recent research on deep plowing (McGill 1982) suggests that up to 1.0 million hectares of solonetzic soils in Alberta could receive substantial and long lasting benefits from the practice.

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1. The Water Advisory Committee, chaired by H. Kroeger, Minister of Transportation, is made up of a cross section of university, government, M.L.A.s and public citizens brought together with a mandate to ensure proper water management in Alberta.

2. The study area was between the 4th and 5th meridian from township 32 to 63 covering most of the province's parkland. The type of drainage would be small scale and on the farm, not requiring large capital or engineering inputs. It is unlikely that sloughs larger than 5 acres in size would be drained. Some wetland areas are presently utilized for grazing or forage production.

Other potentials for agricultural expansion/intensification are liming of acid soils, conversion of improved pasture to cropland, various tillage practices and use of fertilizers.

5.5.1 Summary

Table 15 summarizes some potentials for expanding/intensifying the present agricultural land base. These estimates are rough, but are useful in illustrating the magnitude of the land areas that would be affected by these practices. It must also be noted that some land in the province could benefit from more than one of these practices.

Other areas that have a potential for increasing agricultural production in the province are better farmer education, increased research and applications of technology, preservation of farm land through legislation and conservation of soils and soil fertility.

The purpose of this report is simply to draw attention to potentials for agricultural expansion/intensification on the present agricultural land base. It must be underlined that resource management objectives other than agriculture must be met and will therefore influence the amount of land available for expansion and/or intensification.

Table 15

SOME POTENTIAL METHODS OF EXPANSION/INTENSIFICATION OF THE AGRICULTURAL LAND BASE AND THE POTENTIAL LAND AREAS AFFECTED

Method	Affected Area (millions of hectares)
Reduction of unimproved land base	2.4
Reduction of summerfallow	1.0
Irrigation Expansion	5.0*
Drainage (small scale)	1.0+
Deep Plowing	1.0
Total	Approx. 10.4

* This estimate must be considered as a rough maximum. The actual amount would depend on economic, soil, long term suitability and other factors.

+ This figure was estimated for east central Alberta.

6. CONCLUSIONS AND FUTURE INITIATIVES

The best agricultural land in Alberta is presently being farmed. There are, however, about 4.4 million hectares of public land in the Green Area which is mostly classified as having a marginal capability for tilled cropping. In addition there is a relatively small but unknown amount of public land in the Yellow and White Areas classed as arable, yet is not presently used for agriculture. There is also a potential to expand or intensify agriculture on the existing land base. The reduction of the unimproved land base, reduction of summerfallow, expansion of irrigation, drainage and deep plowing could affect up to 10.0 million hectares of the present agricultural land base. This value must be considered as a maximum as the real area affected could be much smaller.

The following initiatives are offered:

1. The evaluation of the potential for agricultural expansion onto public land can not be considered in isolation from the evaluation of potentials for expansion/intensification on the existing agricultural land base. The assessment of these various potentials must include economic and social considerations. For example, infrastructure to support the increased/intensified land base that would result during a given crop year from summerfallow reduction already exists, whereas costly infrastructure needs would have to be developed for agricultural expansion onto public land.

2. The portions of the Green Area that have the greatest potential for agricultural development according to CLI are in the Peace River - Cadotte Lake area and southeast of Grande Prairie (Figure 4). This is not to suggest these areas should be opened for agriculture, but more detailed investigations could be directed to those areas.

3. More detailed information on the potential productivity of the Green Area is required. CLI is a provincial data base, but biophysical and ecological land classification and evaluation of capability reports at a more detailed level (1:100 000) prepared by the Resource Evaluation and Planning Division, Alberta Energy and Natural Resources, cover much of the land with high capabilities in Figure 4 and could be collated to provide a complementary data base. In addition, inventories being conducted by Public Lands Division and consultants must be continued on a priority basis.

4. An analysis of the agricultural capability and productivity of public land in the Yellow and White Areas would be useful. Such an analysis should also consider the potential to convert rangeland to cultivation.

5. The following potentials for expanding or intensifying the agricultural land base must be investigated in a cost/benefit manner:

- deep plowing
- irrigation
- liming
- drainage
- summerfallow reduction
- reduction of the unimproved land base

6. The CLI Soil Capability for Agriculture was initiated more than 20 years ago. This system has been extremely useful when used in the proper context. Large amounts of crop productivity, soil and ecological data that were not available when the inventory was conducted are no available. For example, based on crop yield data class 3 land in the Peace River region is not the same as class 3 land in central Alberta. This new information could be used to re-evaluate CLI or develop a new objective classification system for agricultural capability and productivity. Work on crop productivity being conducted by Canada Department of Agriculture and Alberta Agriculture should be directed toward this objective.

7. The question of expanding the agricultural land base onto public land and/or expanding or intensifying agriculture on the present agricultural land base must consider alternative uses of the land. The products to be gained from agricultural expansion/intensification must be weighed against the loss of products from alternative uses such as timber production and recreation. Environmental, social and economic consequences must also be examined for each alternative. Plans, policies and programs in other sectors can influence or are influenced by many agricultural activities.

APPENDIX 1

CLI Agriculture Capability Class Groupings of Alberta Soils

Soil Capability Class 1

Class 1 soils occur in areas having no climatic limitations (Climate Area 1) or in areas where climatic limitations (aridity) have been rectified by irrigation. The areas with no climatic limitations occur within the Black and northern portions of the Dark Brown soil groups. The areas in which climatic limitations have been rectified by irrigation occur within the Brown and Dark Brown soil groups in southern Alberta. There are approximately 0.8 million hectares of Class 1 soils in Alberta for both irrigated and dryland conditions which represents less than two percent of the total area covered by the Canada Land Inventory.

These soils have deep, humus-rich surface horizons, a high available moisture holding capacity, a high natural fertility status and respond well to fertilizer application. They are easily managed, have good tilth and are highly productive for a wide range of crops common to the region. The landscape features are ideal; slopes are gentle; drainage is well to moderately well; and stones are absent or present in amounts which present no limitation.

Included in this class, under dryland farming conditions, are the Orthic and Eluviated Black Chernozemic soils and some of the Orthic Dark Gray Chernozemic soils developed on moderately coarse textured parent materials in Climate area 2A are also included when under irrigation.

Soils Capability Class 2

Class 2 soils are the best soils in areas where there are climatic limitations due to either a lack of precipitation (Climatic Area 2A, Figure 2) or a shortened growing season (Climatic Area 2H). Class 2 soils also occur in areas having no climatic limitations (Climatic Area 1 and Climatic Areas 2A and 3A under irrigation) but have a moderate degree of limitation due to adverse soil or landscape characteristics. These soils are found throughout the Black, Dark Brown, Brown, Dark Gray, and Dark Gray Wooded soil groups. There are about 4 million hectares of Class 2 soils in Alberta for both irrigated and dryland conditions.

Soil characteristics of this class include moderately deep humus-rich surface horizons, a moderately high available moisture holding capacity, a moderately high natural fertility status, and the ability to repond well to fertilization. Landscape limitations such as adverse topography can also occur. The above mentioned limitations either singly or in combination impart a moderate degree of limitation to agricultural use. However, with good management and the application of

conservation practices to prevent soil deterioration and/or to improve air and water relationships, these limitations are easily overcome. In fact, in years of favorable precipitation and temperature, Class 2 soils are comparable with Class 1 soils in productivity.

Class 2 areas include many different kinds of soils. Some of these, in Climatic Area 1, are the Orthic and Eluviated Black and Dark Brown Chernozems with moderate topographic limitations and moderate available moisture storage capacity. The Black and Dark Brown Solods with moderate structural limitations are also included. In Climatic Area 2 most of the Orthic and Eluviated Chernozems and Dark Gray Luvisols, with no landscape limitations, are included.

Soil Capability Class 3

Class 3 soils occur in Climatic Areas 1 and 2 with moderate to moderately severe soil and/or landscape limitations and in Climatic Area 3 with no soil or landscape limitations. Thus, Class 3 soils are found throughout all the soil groups in Alberta. There are approximately 16.1 million hectares of Class 3 soils in Alberta for both irrigated and dryland conditions.

Since such a large variety of soils fall within the Class 3 category it follows that a wide range of climatic, soil, and landscape characteristics can impose limitations, either singly or in combination. These limitations impart a moderately severe limitation to agricultural use and tend to reduce the range of crops that can be grown or require special conservation practices to be overcome. The conservation practices are usually more difficult to apply and maintain than for Class 2 soils. The limitations may adversely affect the timing of cultivation, seeding, or harvest; the ease of tillage; choice of crops; or any combination of these limitations to such an extent that Class 3 soils are only medium to moderately high in productivity.

Class 3 areas include different kinds of soils: most of the Chernozemic subgroups in Climatic Areas 1 and 2 with moderately severe topographic or moisture storage limitations; Orthic Gray Luvisols in Climatic Area 2 that have structural limitations; Dark Gray Luvisols and Orthic Brown Chernozems in Climatic Area 3 with no landscape limitations; some of the Gleysolic subgroups with wetness limitations; and some of the Solonetzic subgroups with structural limitations.

Soil Capability Class 4

Class 4 soils occur throughout the province in Climatic Areas 1, 2, and 3 and in all soil groups. There are about 9.3 million hectares of Class 4 soils within the area covered by the Canada Land Inventory.

Many combinations of adverse climatic, soil, and/or landscape characteristics result in these soils having such severe limitations that they are suited only for a very narrow range of crops and the risk of

crop failure is high. Even with high inputs of management, these soils are low to medium in productivity, however, specifically adapted crops may be grown successfully.

Class 4 areas include many different kinds of soils: some of the Gray Luvisol and Eutric Brunisol subgroups, with structural and/or topographic limitations; some of the Greysolic subgroups, with excessive wetness limitations; and some of the Chernozemic subgroups with low moisture storage limitations; some of the Solonetzic subgroups with severe structural limitations. When concerned with a particular area of Clss 4 soils, one should refer back to the soil survey map and report for more detailed information.

Soil Capability Class 5

Class 5 soils occur throughout the province in areas that have very severe limitations as a result of adverse climatic, soil, and/or landscape characteristics. There are more than 11.1 million hectares of Class 5 soils in Alberta within the area covered by the Canada Land Inventory.

The severity of the limitations of these soils renders them unsuitable for annual cultivation. However, depending on the nature of the limitation, Class 5 soils may be improved for the production of perennial forages and pastures. Improvement practises may include brushing, fertilization, seeding and drainage.

Class 5 includes most soils occuring on strongly rolling topography, many Gleysolic subgroups, some Solonetzic subgroups, and those areas where climate is too severe for annual crop production because of a short frost-free period (Climatic Area 5).

Detailed information regarding specific Class 5 areas should be obtained from the soil survey report and map.

Soil Capability Class 6

Class 6 soils occur in all areas of the province. There are more than 3.9 million hectares of these soils within the area covered by the Canada Land Inventory in Alberta.

Class 6 soils have much severe limitations that improvements are not feasible, but they do have some natural grazing potential. Included in Class 6 are areas with extreme topography (river banks, foothills, mountains), extremely droughty soils (sand dunes), very poorly drained soils (peaty Gleysols), and areas with severe climatic restrictions.

Soil Capability Class 7

Soils in this class have no capability for arable agriculture or permanent pasture. This class includes rock outcrops, other non-soil areas and small bodies of water. There are about 4 million hectares of class 7 land mapped in Alberta.

Soil Capability Class 8

This special classification has been introduced by Lands Directorate for computer input only. Land in this category includes:

- Forest Reserves
- National Parks
- Urban Areas
- Provincial Parks
- Industrial Areas

There are approximately 2.6 million hectares of class 8 land mapped in Alberta. Class 8 land is found within CLI surveyed areas.

Organic Soils

Includes all peat land (muskeg) and meadow areas classified as Organic soils (see System of Soil Classification for Canada for definition of Organic Soils). Criteria were not established for evaluating organic soils under the Canada Land Inventory System, hence all organics are grouped together and designated by the Letter O on the Soil Capability for Agriculture maps.

There are more than 6.0 million hectares of Organic Soil areas in Alberta within the area covered by the Canada Land Inventory.

Source: After Brocke 1977

APPENDIX 2

An Administrative Unit Summary of Agricultural Capability

Table 16 summarizes CLI Soil Capability for Agriculture data for Alberta Administrative Units (AAUs) in the province. This summary was accessed through the Canadian Geographic Information System. The AAU summary also classifies the data by Green, Yellow and White Area.

Table 16

CANADA LAND INVENTORY FOR AGRICULTURE DATA BY ALBERTA ADMINISTRATIVE UNITS (AAUs)

CAPABILITY CLASSES
(hectares)

AAU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA AAUs
C 1	G			200	3 200	2 800	100	700		7 000	
	Y		10 400	297 900	121 300	61 600	16 500	41 100		548 800	555 800
C 10	G				100					100	
	W		18 400	179 800	75 500	47 400	13 500	1 000	200	335 800	335 900
C 11	G		3 900	5 500	2 600	800	8 500			21 300	
	W		22 400	100 300	85 300	7 300	2 600			217 900	239 200
C 12	G		3 500		1 900	4 300	100			9 800	
	W		112 900	90 500	143 000	62 100	31 200	700		440 400	450 200
C 13	W		13 500	115 200	62 200	60 700	28 300	1 500		281 400	281 400
C 14	W		4 000	186 800	45 700	39 300	6 800	1 500	100	284 200	284 200
C 16	W			287 500	128 400	51 500	18 600	5 100		491 100	491 100
C 17	G					6 300	4 800			11 100	
	W		2 100	242 400	18 000	100 300	10 600	2 500		375 900	387 000
C 18	W			187 900	67 500	32 800	41 400	1 500	200	331 300	331 300
C 19	W		7 400	138 900	96 700	88 700	20 300	1 000	100	353 000	353 000
C 2	W	1 300		321 200	149 800	91 400	19 900			583 600	583 600
C 20	W			91 500	28 600	19 800	7 700		300	147 900	147 900

Table 16 (continued)

CANADA LAND INVENTORY FOR AGRICULTURE DATA BY ALBERTA ADMINISTRATIVE UNITS (AAUs)

CAPABILITY CLASSES
(hectares)

AAU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA AAUs
C 21	W		200	176 400	68 000	15 300	8 300			268 200	268 200
C 22	W			291 600	26 700	20 000	11 600	100	400	350 500	350 500
C 23	W		5 400	268 900	75 400	49 000	10 700	3 000		412 400	412 400
C 24	W		1 100	369 000	117 300	35 400	28 400		200	551 300	551 300
C 25	W		9 100	220 700	76 100	19 600	20 300	2 100	3 000	350 900	350 900
C 26	W	81 400		165 200	19 800	9 200	14 800	1 500	100	292 100	292 100
C 27	W		100	219 000	66 400	7 200	7 300		300	300 200	300 200
C 28	W		21 700	135 100	93 700	37 900	4 200			292 600	292 600
C 29	W			348 200	26 800	5 500	28 500	200	200	409 500	409 500
C 3	G W		25 000	170 800	48 300	100 49 600	6 400	700	100	100 300 900	301 000
C 30	W			204 000	14 100	13 400	17 600			249 100	249 100
C 31	G W		9 300 32 900	200 136 100	10 200 98 000	20 100 36 500	5 300 20 600	1 200 2 000		46 300 326 100	372 400
C 4	W	93 200		3 500	106 700	315 600	76 900	10 900	300	607 100	607 100
C 5	W	5 000		265 400	96 600	65 000	21 500	4 000	500	458 000	458 000

Table 16 (continued)

CANADA LAND INVENTORY FOR AGRICULTURE DATA BY ALBERTA ADMINISTRATIVE UNITS (AAUs)

CAPABILITY CLASSES
(hectares)

AAU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA AAUs
C 6	W			206 900	109 100	74 100	15 300	3 000	700	409 100	409 100
C 7	W		32 000	91 500	64 800	11 000	16 600	300		216 200	216 200
C 8	W	48 600		158 000	296 900	117 200	83 400	22 800		726 900	726 900
C 9	W			250 000	66 100	25 200	6 400	200		347 900	347 900
ID 1	W	23 700		83 400	424 500	325 100	191 600	23 700	1 200	1 073 200	1 073 200
ID 10	G		72 600	900	18 100	508 400	172 700	877 900	1 700	1 652 300	
	W		51 400	27 600	81 600	63 100	8 300	5 800		237 800	1 890 100
ID 12	G					300	100	2 400	808 200	811 000	
	8								1 100	1 100	
	b	168 000								168 000	980 100
ID 14	G		36 500	1 100	45 000	724 700	234 500	690 600	325 700	2 358 100	
	W		68 700	32 500	135 600	43 100	15 100		1 300	296 300	2 654 400
ID 15	G		71 500	9 300	287 200	252 100	65 600	25 500		711 200	
	W		10 200	14 900	70 800	12 300	5 100			113 300	824 500
ID 16	G		153 300	118 500	666 900	731 000	18 500	1 110 000	133 900	2 932 100	
	Y		39 100	244 100	106 900	17 000	15 600	36 400		459 100	3 391 200
ID 17	G	1 373 600	1 494 100	161 400	1 495 400	1 645 300	114 400	119 100		6 403 400	
	W		35 800	1 100	43 100	17 800	8 600	800		107 200	
	Y		63 300	307 600	167 800	29 100	4 700	35 200		607 700	7 118 300

Table 16 (continued)

CANADA LAND INVENTORY FOR AGRICULTURE DATA BY ALBERTA ADMINISTRATIVE UNITS (AAUs)

CAPABILITY CLASSES
(hectares)

AAU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA AAUs
ID 18	G	5 616 000	186 100		86 500	398 900	14 900	13 700	208 600	6 524 700	
	W		95 100	16 600	228 600	356 600	30 300	1 000		728 100	
	8	300			100	600			200	1 200	7 254 000
ID 19	G		2 500	18 800	16 200	6 000	15 900	23 900		83 300	
	Y		6 500	133 700	34 600	3 400	1 600	24 200		204 000	287 300
ID 20	G		11 500	32 300	110 500	86 900	13 100	27 600		281 900	
	Y		2 300	193 900	42 500	15 800	2 900	50 400		307 800	589 700
ID 21	G		33 100	15 300	55 800	213 300	6 500	98 900		422 900	
	Y		28 000	137 200	105 800	35 400	5 500	21 600		333 500	756 400
ID 22	G		38 800	22 600	36 100	168 900	200	16 400		283 000	
	Y		40 800	200 900	147 500	22 800	2 500	43 600		458 100	741 100
ID 23	G	2 230 300	1 116 000	69 400	1 042 300	2 708 000	188 300	304 600		7 658 900	
	Y	100	81 600	159 100	365 300	92 700	32 400	24 000		755 200	8 414 100
ID 24	G	150 000	200	100	100	400	100			150 900	150 900
ID 4	G					100		100	47 200	47 400	
	W					1 500			1 500	3 000	
	8										50 400
ID 5	G					10 400	53 800	64 800	1 100	130 100	
	W					6 200	11 900	2 600		20 700	
	8								500	500	151 300

Table 16 (continued)

CANADA LAND INVENTORY FOR AGRICULTURE DATA BY ALBERTA ADMINISTRATIVE UNITS (AAUs)

CAPABILITY CLASSES
(hectares)

AAU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA AAUs
ID 6	G					20 800	57 300	146 400	600	225 100	
	W			3 900		39 800	21 500	1 100		66 300	
	8							200	800	1 000	292 400
ID 8	G		7 400			52 500	171 900	405 500	400	637 700	
	W		400			14 400	40 600	15 000		70 400	
	8							200		200	708 300
ID 9	G					100		1 300	674 800	676 200	
	W								100	100	
	8								300	300	676 600
MD 130	G		300		2 200	4 300	200	4 800		11 800	
	Y		11 900	190 100	31 600	9 500	1 500	27 400		272 000	283 800
MD 133	G			100	200			200		500	
	Y		100	56 300	1 000	400	500	10 600		68 900	69 400
MD 135	G							100		100	
	Y		800	65 200	7 900	800	200	13 800		88 700	88 800
MD 136	Y		3 700	101 300	9 400	2 400	2 000	21 400		140 200	140 200
MD 14	W	78 800		88 400	154 300	68 800	30 600	800	200	421 900	421 900
MD 26	G			200	200	10 700	2 100			13 200	
	W			259 400	42 400	121 000	23 100			445 900	459 100
MD 31	G					300	400			700	
	W		200	209 700	24 800	118 500	21 000	5 900		380 100	380 800

Table 16 (continued)

CANADA LAND INVENTORY FOR AGRICULTURE DATA BY ALBERTA ADMINISTRATIVE UNITS (AAUs)

CAPABILITY CLASSES
(hectares)

AAU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA AAUs
MD 34	W			36 600	41 900	25 900	6 700			111 100	111 100
MD 44	G					300	300	100		700	
	W		1 300	299 500	32 600	101 100	34 800	2 100	400	471 800	472 500
MD 47	W			154 100	53 000	32 900	8 800	8 300		257 100	257 100
MD 48	W			252 900	27 400	28 900	13 200	16 600	100	339 100	339 100
MD 52	W			155 200	98 500	63 700	47 000			364 400	364 400
MD 6	W	20 200		236 400	93 800	94 500	37 100	100	400	482 500	482 500
MD 61	W		200	189 500	92 900	31 000	100 500			414 000	414 000
MD 87			5 900	86 900	79 500	44 500	20 700	2 100		239 600	239 600
MD 9	G					300	600			900	
	W			126 900	24 800	82 400	53 300	500	100	288 000	288 900
MD 90	W		3 300	164 800	20 100	11 100	7 100			206 400	206 400
MD 92	G		3 700	100	800		8 800			13 400	
	W		34 800	167 200	77 700	17 400	8 100			305 200	318 600
SA 2	W			37 000	274 400	520 000	109 800	9 300	900	951 400	951 400
SA 3	W			16 900	385 000	289 100	70 300	2 500		763 800	763 800
SA 4	W			70 100	109 600	140 200	45 000			364 900	364 900

Table 16 (continued)

CANADA LAND INVENTORY FOR AGRICULTURE DATA BY ALBERTA ADMINISTRATIVE UNITS (AAUs)

CAPABILITY CLASSES
(hectares)

AAU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA AAUs
MED	W				1 200	1 500	800		1 700	5 200	5 200
MILIT	W				200	100			261 600	261 900	261 900
ELK I	W			5 100	4 700	7 200				17 000	17 000
RED D	W			1 900		100	200	1 400	200	3 800	3 800
GR PR	Y			2 300				100	1 900	4 300	4 300
CFB N	W			1 700					1 000	2 700	2 700
DRUM	W			3 000	4 800	200	600	10 200	100	18 900	18 900
ST AL	W			2 100					200	2 300	2 300
CAL	W			8 500	1 000	2 500	100		27 900	40 000	40 000
EDM	W		200	16 500			2 100		13 500	32 300	32 300
COLD L	W		100	300	2 200	500	300			3 400	3 400
LETH	W	500		2 300		300			2 300	5 400	5 400

LEGEND:

Administrative Units -

ID - Improvement District
C - County
MD - Municipal District
SA - Special Area

Land Designation

G - Green Area
W - White Area
Y - Yellow Area
8 - Unclassified by land designation
b - No coverage

MED H - Medicine Hat
MILIT - Military Range
ELK I - Elk Island
RED D - Red Deer
GR PR - Grande Prairie
CFB N - CFB Namao
DRUM - Drumheller
ST AL - St. Albert
CAL - Calgary
EDM - Edmonton
COLD L - Cold Lake
LETH - Lethbridge

CLI

N/C - Not classified. This land is outside of the CLI area or it is irrigated land not classified for dryland agriculture.

8 - Water bodies, provincial parks, national parks, built-up areas.

APPENDIX 3

A Forest Management Unit (FMU) Breakdown of Agricultural Capability

Table 17 summarizes CLI Soil Capability for Agriculture data for Forest Management Units (FMUs) in the province. The summary was compiled through the Canadian Geographic Information System.

Tables 18 to 23 are reproduced from Marciak (n.d.). They serve as a first look at the agricultural suitability of a number of sites in the Peace River Region that have relatively high capability for agriculture.

Table 17 CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

FMU	LAND DESIG.	N/C CLI	ORGANIC	CAPABILITY CLASSES (hectares) 1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
A 1	G	264 900	1 600		200					266 700	266 700
A 2	G	460 500								460 500	460 500
A 3	G	407 400								407 400	407 400
A 4	G	189 300								189 300	189 300
A 5	G	361 500								361 500	361 500
A 6	G	335 100								335 100	335 100
A 7	G	500 600								500 600	500 600
A 8	G	353 400								353 400	353 400
A 9	G	599 000								599 000	599 000
A 10	G	367 200								367 200	367 200
A 11	G	325 400								325 400	325 400
A 12	G	517 000								517 000	517 000
A 13	G	848 900								848 900	848 900
B 1	G W					17 500 500	38 700 700	139 800		196 000 1 200	197 200

Table 17 (continued)

CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
B 2	G					2 400	12 500	141 900	900	157 700	
	W						400	1 000		1 400	
	8							100		100	159 200
B 3	G		3 000			5 300	36 900	28 900	500	74 600	
	W					400	500	300		1 200	75 800
B 4	G		2 200			12 600	35 000			49 800	
	W					400	100			500	50 300
B 5	G		1 700			10 000	29 400	32 000	100	73 200	
	W					100				100	73 300
B 6	G		5 200	100		63 400	54 700	107 200	900	231 500	
	W		100			900	200			1 200	232 700
B 01	G					400	1 500	5 800		7 700	
	W		1 400	120 900	26 000	141 600	49 300	6 500	200	345 900	353 600
B 02	G		400			1 700	6 700	300		9 100	
	W		9 000	245 100	50 700	163 700	43 000	10 100	100	521 700	530 800
C 1	G			200	200	29 300	32 200	30 500		92 400	
	W					200	200	100		500	92 900
C 2	G					6 100	41 500	107 700	600	155 900	
	W						100			100	
	8							100	200	300	156 300

Table 17 (continued)
CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
C 3	G					6 200	40 200	52 900	700	100 000	
	W								100	100	100 100
	8										
C 4	G								100	100	
	W					2 200			200	2 400	2 500
C 01	G					300	100	200	47 000	47 600	
	W	17 800		171 200	50 500	90 200	40 300	1 600	1 800	373 400	
	8										421 000
C 02	G					500	300	200		1 000	
	W			114 700	34 300	195 400	72 100	6 600		423 100	424 100
E 1	G		52 100		600	85 200	31 400	2 300		171 600	
	W		100							100	171 700
E 1N	G		22 800			42 000	8 300	66 000		139 100	139 100
E 2	G		29 700		12 500	53 400	12 600	12 000		120 200	
	W				100					100	120 300
E 3	G							3 600	500	4 100	4 100
E 3N	G		12 100			78 400	15 300	58 400		164 200	164 200
E 4	G					300	1 300	47 500	1 100	50 200	50 200

Table 17 (continued)

CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
E 4N	G		38 500			31 800	35 900	105 700		211 900	211 900
E 5	G		8 500			21 600	6 200	95 900	1 200	133 400	133 400
E 6	G		10 500			38 800	11 500	15 200		76 000	76 000
E 6N	G		15 400			39 200	40 500	60 600		155 700	155 800
E 7	G		20 200			101 700	12 100	51 800	400	186 200	186 200
E 7N	G		9 000			12 300	11 500	81 200	200	114 200	114 200
E 8	G		5 700			87 900	700	113 800	300	208 400	208 400
E 8C	G							28 100		28 100	28 100
E 9	G					4 200	4 600	1 800	600	11 200	11 200
E 10	G							73 000	600	73 600	73 600
E 11	G		100			2 400	10 000	80 100	600	93 200	93 200
E 12	G		1 600		5 400	55 500	6 600	26 700		95 800	95 800
E 01	G		200		300	200	100			800	
	W		19 200		48 900	25 600	7 100		1 300	102 100	102 900
F 1	G	12 800	44 700	10 500	102 400	154 600	11 800	54 500		391 300	
	Y			100	100			200		400	391 700

Table 17 (continued)

CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
F 2	G	391 900								391 900	391 900
F 3	G	331 200								331 200	331 200
F 4	G	4 700	83 800	2 900	104 400	89 700	6 600			292 100	292 100
F 5	G	72 400	81 800	19 900	84 300	55 100		100		313 600	
	Y		100		100	1 200				1 400	315 000
F 6	G	15 900	50 400	19 200	65 200	187 800	6 000	6 400		350 900	350 900
F 7	G	8 600	23 200	2 200	26 700	194 400	18 400	10 800		284 300	
	Y					100				100	284 400
F 8	G	36 900	45 200		18 400	222 600		400		323 500	
	Y					100				100	323 600
F 9	G	330 800								330 800	330 800
F 10	G	613 300	27 800			52 800		1 000		694 900	694 900
F 12	G		80 800	700	118 500	92 700	9 900	5 900		308 500	308 500
F 13	G		170 100		28 900	189 900	1 600	3 600		394 100	394 100
F 14	G		77 600	3 000	119 400	73 400	21 100	6 600		301 100	301 100
F 15	G	15 800	22 100	1 300	113 900	105 100	200	8 000		266 400	266 400
F 16	G	124 600	33 000		34 000	4 400				196 000	196 000

Table 17 (continued)
CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
F 17	G	180 900	25 300	600	26 200	24 900	6 300	11 500		275 700	275 700
F 18	G	230 000								230 000	230 000
F 19	G	279 700								279 700	279 700
F 20	G	810 700								810 700	810 700
F 01	G		30 300	2 800	116 700	48 600	46 400	3 900		248 700	
	Y	100	70 800	100 200	246 800	75 900	32 200	15 000		541 000	789 700
G 1	G		8 800	12 600	99 100	77 800	12 300	11 600		222 200	
	Y			200	300	300				800	223 000
G 2	G		2 300	7 000	8 800	11 500	19 400	22 400		71 400	
	Y			100	200	100		100		500	71 900
G 2C	G		2 800	5 800	46 100	6 600		9 200		70 500	
	Y			300	500					800	71 300
G 3	G		8 100	1 000	44 600	36 100	26 000	242 700		358 500	358 500
G 4	G		10 800	22 500	64 700	5 100	8 700	83 600		195 400	
	Y			100				100		200	195 600
G 5	G		20 900	32 900	99 300	14 700	29 200	20 300		217 300	217 300
G 5C	G		4 000	1 000	106 100	39 700	5 300	72 100		228 200	
	Y										228 200

Table 17 (continued)
CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
G 6	G							185 500	500	186 000	186 000
G 7	G				9 400	49 700	3 000	144 100		206 200	206 200
G 8C	G			13 700	1 400	3 000	800	10 200		29 100	
	Y			100				100		200	29 300
G 9	G		1 800	8 000	6 500	5 000		1 700		23 000	
	Y			1 600	100	100		100		1 900	24 900
G 10	G		200	7 500	2 400		400			10 500	
	Y			200	100					300	10 800
G 01	G		400	2 300	2 900	3 400	500	600		10 100	
	Y		17 200	318 200	128 900	62 000	20 500	44 000	1 900	592 700	602 800
G 02	G		6 300	10 900	13 300	2 600	1 800	6 400		41 300	
	Y		5 400	71 400	24 200	4 100		15 300		120 400	161 700
G 03	G		1 800	9 200	18 000	7 900	500	24 200		61 600	
	Y		8 800	391 500	79 900	18 800	5 600	88 200		592 800	654 400
G 04	G		8 600	34 000	10 300	2 200		1 900		57 000	
	Y		13 100	141 600	53 200	4 500	3 800	15 900		232 100	289 100
H 1	G		100			400	2 300	300		3 100	3 100
L 1	G	255 900	16 600		3 000	63 800	1 400		700	341 400	
	Y		100			200				300	341 700

Table 17 (continued)

CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
L 2	G		102 300		93 200	76 100	4 800	2 100		278 500	
	W		100							100	278 600
L 3	G	161 300	165 800		38 600	181 300	3 000	19 500		569 500	569 500
L 4	G	286 000				1 500				287 500	287 500
L 5	G	315 000								351 000	351 000
L 6	G	378 500								378 500	378 500
L 8	G	800	53 800		41 800	20 500	3 800	1 800		122 500	
	W				100	100				200	122 700
L 9	G	296 900	800		300	5 000	100		207 800	510 900	510 900
L 01	G	200	31 000		10 600	128 600	6 600			177 000	
	W		249 200	549 300	651 500	509 600	140 700	6 500	100	2 106 900	2 283 900
M 1	G		6 600	500	42 100	2 400	3 400	600		55 600	
	Y		5 800	19 100	78 500	8 200	100	4 200		115 900	171 500
M 3	G		17 600	1 100	66 200	32 600	500	1 100		119 100	
	Y		6 900	3 400	25 300	6 200	500	2 500		44 800	163 900
M 4	G		2 000	7 500	6 200	6 700	1 600	1 300		25 300	
	Y		3 000	4 800	100	500				8 400	33 700
M 7	W		2 700		7 300	65 300	3 200			78 500	78 500

Table 17 (continued)
CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
M 9	W		1 700		900	22 400		100		25 100	25 100
M 10	W				2 200	33 500				35 700	35 700
P 1	G		66 600	500	13 100	183 100	4 400	78 800		346 500	346 500
P 2	G		26 800	700	30 000	220 200	1 000	42 400		321 100	
	Y										321 100
P 3	G		90 000	19 100	101 100	68 400	5 000	1 200		284 800	
	Y		400	100	500					1 000	285 800
P 4	G		171 900	65 500	95 700	24 300	8 700	15 800		381 900	
	Y			200				100		300	382 200
P 5	G	14 600	81 600	22 600	51 600	149 200	17 900	11 200		348 700	
	Y			100				400		500	349 200
P 6	G		45 500	4 500	10 000	220 600	900	13 600		295 100	
	Y										295 100
P 7	G		66 500			221 500	31 400	47 200		366 600	366 600
P 8	G		55 400			241 000	9 400	39 900		345 700	345 700
P 9	G		68 600		7 700	204 100	6 600	11 300		298 300	298 300
P 10	G		41 000	3 600	19 800	232 200	8 300	34 100		339 000	
	Y			100	200			100		400	339 400

Table 17 (continued)

CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
P 11	G		100	100	8 600	400	100	4 900		14 200	
	Y				100					100	14 300
P 01	G		100	100	100	1 000		1 500		2 800	
	Y		33 200	259 300	63 500	16 200	1 600	34 100		407 900	410 700
P 02	G		2 100	14 000	16 700	9 400	500	22 100		64 800	
	Y		31 500	237 800	114 600	37 800	7 400	43 000		472 100	536 900
P 03	G		12 400	18 900	22 900	55 300	700	11 700		121 900	
	Y		46 500	305 600	195 300	30 800	2 800	60 900		641 900	763 800
R 1	G		24 900	500	17 600	104 700	10 600	11 400		169 700	
	W					100				100	169 800
R 2	G		24 300			179 200	14 900	34 300		252 700	252 700
R 3	G		17 200			52 500	18 900	184 500	100	273 200	273 200
R 4	G		35 700		6 600	115 400	18 000	11 600		187 300	187 300
R 5	G		3 700			41 200	14 900	21 800		81 600	
	W										81 600
R 6	G		200			1 200	16 100	198 300	500	216 300	216 300
R 7	G		3 400		200	62 200	6 100	8 300		80 200	
	W						100			100	80 300
R 8	G		500			11 600	10 100	163 700	300	186 200	186 200

Table 17 (continued)

CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
R 9	G		3 900	300		30 100	38 800	91 900	500	165 500	165 500
R 01	G		800		500	1 100	2 200	100		4 700	
	W		104 000	312 600	243 300	169 200	33 600	10 100		872 800	877 500
S 1	G		21 000	12 900	143 200	179 700	10 100	16 800		383 700	
	Y			100	200	100				400	384 100
S 2	G		3 500	1 400	90 700	126 000	3 100	19 800		244 500	
	Y				200					200	244 700
S 3	G		20 700	11 300	92 700	20 900	1 100	100		146 800	
	Y			100						100	146 900
S 3V	G			600						600	
	Y			300						300	900
S 4	G	93 400	147 300		99 600	92 800	700	4 500		438 400	438 400
S 5	G		83 200		123 700	182 500	5 700	14 200		409 300	409 300
S 6	G		34 900	1 700	162 300	47 400		6 900		253 200	253 200
S 7	G		77 800	1 900	47 300	62 900	46 700	900		237 500	
	Y		200		400	300	100			1 000	238 500
S 8	G	19 800	124 300		81 700	57 000	6 800	200		289 800	289 800
S 9	G		89 200		66 000	81 500	2 900	2 300		241 900	241 900

Table 17 (continued)

CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
S 10	G		134 100	16 000	150 300	91 300	5 100			396 800	396 800
S 11	G		131 900		10 300	158 300	5 400	3 000		308 900	308 900
S 12	G	333 500								333 500	333 500
S 13	G	451 300								451 300	451 300
S 14	G	223 900	41 300		2 400	82 300		6 000		355 900	355 900
S 15	G	268 100	51 100		69 600	50 900				439 700	439 700
S 01	G		9 400	100	5 400	3 500	1 900			20 300	
	W		81 700	145 500	129 200	37 200	13 700	800		408 100	428 400
S 02	G		400	1 500	3 600	200		200		5 900	
	Y		44 000	235 000	121 300	23 400	8 200	25 300		457 200	463 100
W 1	G		26 100		56 300	194 700	9 300	19 600		306 000	306 000
W 2	G		34 000		113 500	57 400	14 700	3 600		223 200	
	Y				100					100	223 300
W 3	G		42 700	1 200	135 400	189 600	13 700	9 600		392 200	
	W		300		1 200					1 500	393 700
W 4	G		16 300	1 100	128 000	178 900	16 700	8 600		349 600	
	W				200		300			500	350 100

Table 17 (continued)

CANADA LAND INVENTORY SOIL CAPABILITY FOR AGRICULTURE DATA BY FOREST MANAGEMENT UNITS (FMUs)

CAPABILITY CLASSES
(hectares)

FMU	LAND DESIG.	N/C CLI	ORGANIC	1-3	4	5	6	7	8	TOTAL LAND DESIG.	TOTAL AREA FMUs
W 5	G		20 500	1 100	40 400	45 000	30 600	1 400		139 000	
	W		100		600	100	100			900	139 900
W 6	G		71 800	1 200	28 300	130 100	13 200	200		244 800	
	W		100	200	100	200				600	245 400
W 01	G		100	100	400	200	100			900	
	W		34 300	10 400	90 200	20 300	8 000			163 200	164 100
W 02	G		9 600	11 200	8 800	18 900	14 500			63 000	
	W		91 500	380 300	327 600	89 200	21 600	800		911 000	974 000
W 03	G						200			200	
	Y		1 400	2 800	6 200	100	3 000			13 500	13 700

LEGEND:

Forests -

A	-	Athabasca
B	-	Bow
C	-	Crowsnset
E	-	Edson
F	-	Footner Lake
G	-	Grande Prairie
H	-	Hinton
L	-	Lac La Biche
M	-	Metis
P	-	Peace River
R	-	Rocky
S	-	Slave
W	-	Whitecourt

Land Designations -

G	-	Green Area
W	-	White Area
Y	-	Yellow Area
8	-	Unclassified by land designation
b	-	No coverage

CLI

N/C - Not classified. This land is outside of the CLI area or it is irrigated land not classified for dryland agriculture.

8 - Water bodies, provincial parks, national parks, built-up areas.

Tables 18 to 23 were compiled by Alberta Agriculture (Marciak n.d.). Undevelopable and developable areas were estimated from soil surveys, but they can only be viewed as very rough estimates. Detailed site specific analyses would be required to properly determine developable and undevelopable areas.

Table 18

SUMMARY OF POTENTIAL ARABLE LANDS IN HIGH LEVEL - WEST REGION

(1 000 hectares)

LOCATION: FOREST MANAGEMENT UNIT	CLI (1-4)	MINUS UNDEVELOPABLE AREA CLI (1-4)	POTENTIAL DEVELOPABLE ARABLE (1-4)	LEGAL SURVEY	ROADS	DRAINAGE	ADJACENT TO FARM AREA
F01	120	39	81	Needed	Feeder	Needed	Yes
F1	113	72	41	Needed	Bridges, Trunk, Feeder	Needed	Yes
F12	119	79	40	Needed	Trunk, Feeder	Needed	No
F13	29	12	17	Needed	Trunk, Feeder	Needed	No
F14	120	41	79	Needed	Trunk, Feeder	Needed	No
F15	114	27	87	Needed	Feeder	Needed	Yes
F17	27	12	15	Needed	Feeder	Needed	No
TOTALS	642	282	360				

Table 19

SUMMARY OF POTENTIAL ARABLE LANDS IN FORT VERMILION REGION

(1 000 hectares)

LOCATION: FOREST MANAGEMENT UNIT	CLI (1-4)	MINUS UNDEVELOPABLE AREA CLI (1-4)	POTENTIAL DEVELOPABLE ARABLE (1-4)	LEGAL SURVEY	ROADS	DRAINAGE	ADJACENT TO FARM AREA
F4	107	40	67	Needed	Bridges, Feeder, Trunk	Needed	No
F5	104	23	81	Needed	Trunk, Feeder	Needed	Yes
F6	84	40	44	Needed	Feeder	Needed	No
F7	29	8	21	Needed	Feeder	Needed	Yes
TOTALS	324	111	213				

Table 20

SUMMARY OF POTENTIAL ARABLE LANDS IN EAST MANNING REGION

(1 000 hectares)

LOCATION: FOREST MANAGEMENT UNIT	CLI (1-4)	MINUS UNDEVELOPABLE AREA CLI (1-4)	POTENTIAL DEVELOPABLE ARABLE (1-4)	LEGAL SURVEY	ROADS	DRAINAGE	ADJACENT TO FARM AREA
S10	166	30	148	Needed	Trunk, Feeder	Needed	No
S15	70	29	40	Needed	Trunk, Feeder	Needed	No
		*Majority of area unclassified					
P3	120	39	80	Needed	Trunk, Feeder	Needed	Yes
P4	161	51	110	Needed	Trunk, Feeder	Needed	Yes
P5	74	20	54	Needed	Trunk, Feeder, Bridges	Needed	No
TOTALS	591	169	432				

Table 21

SUMMARY OF POTENTIAL ARABLE LANDS IN SLAVE LAKE - CALLING LAKE REGION

(1 000 hectares)

LOCATION: FOREST MANAGEMENT UNIT	CLI (1-4)	MINUS UNDEVELOPABLE AREA CLI (1-4)	POTENTIAL DEVELOPABLE ARABLE (1-4)	LEGAL SURVEY	ROADS	DRAINAGE	ADJACENT TO FARM AREA
S1	156	39	117	Needed	Trunk, Feeder	Needed	Yes
S2	92	23	69	Needed	Trunk, Feeder	Needed	Yes
S3	104	26	78	Needed	Trunk, Feeder	Needed	Yes
S5	124	32	91	Needed	Bridge, Trunk, Feeder	Needed	No
S6	164	40	124	Needed	Bridge, Trunk, Feeder	Needed	No
S7	49	14	35	Needed	Trunk, Feeder	Needed	No
L2	93	40	53	Needed	Trunk, Feeder	Needed	No
TOTALS	782	214	568				

Table 22

SUMMARY OF POTENTIAL ARABLE LANDS IN THE GRANDE PRAIRIE REGION
(1 000 hectares)

LOCATION: FOREST MANAGEMENT UNIT	CLI (1-4)	MINUS UNDEVELOPABLE AREA CLI (1-4)	POTENTIAL DEVELOPABLE ARABLE (1-4)	LEGAL SURVEY	ROADS	DRAINAGE	ADJACENT TO FARM AREA	FOREST MANAGE-MENT AREA
G01	5	1	4	Not Needed	Feeder	Possibly	Yes	No
G02	24	6	18	Not Needed	Bridges, Trunk, Feeder	Possibly	Yes	No
G04	44	8	36	Needed	Bridges, Trunk, Feeder	Possibly	Yes	No
G3	45	14	32	Needed	Bridges, Trunk, Feeder	Needed	Yes	No
NOT COMMITTED	118	29	90					
G2	16	4	12	Needed	Trunk, Feeder	Needed	Yes	Yes Proctor and Gamble
G2C	52	14	38	Needed	Trunk, Feeder	Needed	Yes	Yes
G4	87	20	67	Needed	Trunk, Feeder	Needed	Yes	Yes
G5	132	40	82	Needed	Bridges, Trunk, Feeder	Needed	Yes	Yes
G5C	107	24	83	Needed	Bridges, Trunk, Feeder	Needed	Yes	Yes
W1	56	14	42	Needed	Bridges, Trunk, Feeder	Needed	Yes	Yes
COMMITTED	450	116	334					
TOTAL COMMITTED AND NON-COMMITTED	568	145	423					

Table 23

SUMMARY OF POTENTIAL ARABLE LANDS IN THE WHITECOURT AREA

(1 000 hectares)

LOCATION: FOREST MANAGEMENT UNIT	CLI (1-4)	MINUS UNDEVELOPABLE AREA CLI (1-4)	POTENTIAL DEVELOPABLE ARABLE (1-4)	LEGAL SURVEY	ROADS	DRAINAGE	ADJACENT TO FARM AREA	FOREST MANAGE-MENT AREA
W2	113	28	85	Needed	Bridges,	Needed*	No	No
					*Soil erosion prevention			
W3**	137	55	82	Needed	Bridges, Trunk, Feeder	Needed	Yes	No
	250	83	167					
W4**	129	51	78	Needed	Bridges, Trunk, Feeder	Needed	No	Yes
TOTAL	379	134	245					

** Estimated that arable land committed in W3 = arable land committed in We.

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